2016 Annual Progress Report and 2017 Program Plan of the Gemini Observatory

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Guide to Locating Material According to Cooperative Agreement Terms and Conditions

Requirement	Description	Fulfillment
a.i	Summary of achievements, including a comparison of actual accomplishments versus goals	4,5; Appendix I
a.ii	Identification of problems faced, their solutions and impact on observatory operations	4,5
a.iii	List of observing programs, with their investigators, site visitors, observers, and hours devoted to each	Appendix D
a.iv	Report on the education and public outreach activities including non-scientific visitor statistics, press releases, etc.	6, Table 6-1
b.	Scientific accomplishments of the scientific staff, as well as their activities and expectations for the calendar year	Appendices B, E
c.	Technical accomplishments of each technical department, as well as the Departments' expectations for the calendar year	4, 5, 8
d.	Listing of publications and reports produced by staff and, as far as possible, the users of the observatory	Appendices B, C
e.	Table showing the division of effort, adding up to 100 percent, for all scientific staff and/or Key Personnel among major activities, such as administration, visiting observer support, scientific research, etc.	Appendix E, Table E-1
f.	Chart or other description of Gemini's organization during the new program year together with an explanation for any changes from the previous year's organization	Appendix F
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1 Executive Summary

Gemini Observatory operates twin 8-meter diameter optical/infrared telescopes located on two of the best observing sites on Earth. Locations in the northern and southern hemispheres (Hawai'i and Chile) provide access to the entire sky. A range of instrumentation provides for visual and infrared imaging and spectroscopy, with enhancements from adaptive optics and specialized instrumentation.

Two primary activities dominate the work of the Observatory. The first is in maintaining and supporting operations on behalf of the international scientific community of the Gemini Partnership. The Observatory's goal is to enable our users' scientific progress by being an efficient, nimble, and responsive observatory. We offer a variety of observing and proposing modes to suit the varying needs of our individual Principal Investigators (PIs). Astronomers may visit and conduct their own observations, or have staff execute their observations in a "queue" mode. The queue matches observing conditions to science programs, and provides access to the time domain. Now well-established, the Fast Turnaround program allows monthly proposals; combined with rapid peer review by other PIs, successful proposers can obtain data as early as a month after having their scientific idea.

Gemini's second primary activity is the development of instrumentation and facilities. Development projects provide novel capabilities for users through new facility instruments and upgrades to existing ones, on both small and large scales. The facility instruments and adaptive optics systems remain stable on both telescopes, with improvements to the popular GMOS (Gemini Multi-Object Spectrograph) instruments, including a detector upgrade to increase sensitivity. Visiting instruments increasingly expand the range of capabilities for all users; with a well-established, demand-driven program in the North, 2016 saw the first run of the speckle imager DSSI, and the return (as a visitor) of the high-resolution infrared spectrometer Phoenix to Gemini South.

The Transition Program (TP) is wrapping up with a total realized savings of more than $1M per year, leaving Gemini sustainable for the longer term. Key ingredients of the TP include the Base Facility Operations (BFO) project, which concluded in 2016 and enabled us to operate both Gemini North (GN) and Gemini South (GS) from their respective base facilities at night. Our efforts in energy savings continued with the installation of solar arrays at both the Hilo Base Facility and on Cerro Pachón. With the end of the transition we are ramping up on activities such as planning for obsolescence mitigation, which will form a key part of our engineering operation over the coming five years.

In addition to these primary activities, we are concentrating increasing effort on the provision of post-observing support for scientists across the Partnership, via the Science User Support Department, while continuing our regular outreach activities. 2016 saw considerable technical and structural improvements to the Data Reduction Users' Forum, and the introduction of non-staff contributors who have reinvigorated the flow of information there. Local outreach programming, including the annual Journey Through the Universe and Viaje al Universo events, kept our local host communities actively engaged. Meanwhile, coordination with the new Science User Support Department (SUSD) expanded dramatically and communications with our scientific users continued to evolve as service to users became an ever more important aspect of all Observatory

staff's core responsibilities. Several members of the Directorate attended the American Astronomical Society meeting in January 2016. The Deputy Director attended La Sociedad Chilena de Astronomía (SOCHIAS) meeting in March and Sociedade Astronômica Brasileria (SAB) meeting in August; the Director attended the Canadian Astronomical Society (CASCA) meeting in June; and the Associate Director for Operations attended the La Asociación Argentina de Astronomía (AAA) meeting in September.

Gemini users continued to generate impressive science results; over the full range of astronomical study enabled by the Observatory. 2016 saw the first publications of data from GRACES, the novel spectrograph fed by fiber from Gemini to CFHT, and an example of the sort of science being done is included in the Science Highlights section of this report. The rate of peer-reviewed publications based on Gemini observations continues to be competitive, and adaptive optics results remain more than 20% of the Observatory's output.

The Development Division focused its efforts on the next facility-class instruments and a new laser for Gemini South. GHOST, the high-resolution spectrometer, proceeded into its build phase in 2016, and the Request for Proposals (RfP) for the next-generation instrument Gen 4#3 was released in May. We received proposals for that instrument in August, and made a selection recommendation to the Board in November. We are now working on contract negotiations. In addition, we signed a contract for a new laser for the Gemini Multi-Conjugate Adaptive Optics System (GeMS) at Gemini South. We expect delivery of the laser by the end of 2016 with installation and integration complete by mid-2017.

We continue to manage the Gemini budget and hit targets as set by the Observatory Governance. The 2016 budget is expected to be spent within the target tolerance range. Tables 1-1 and 1-2 summarize the spending and FTE levels of Gemini Observatory in 2016. Gemini's staffing remains at the post-transition level, with approximately 168 FTEs distributed evenly between the two sites. The principal sources of budget variance were the devaluation of the Chilean Peso, a net decrease of $1M in labor costs (partly offset by hiring into extra positions), reduced electricity and indirect costs, increasing project costs, and the purchase of a new laser for Gemini North.

Fund	2016 Actual
Operations and Maintenance (O&M)	$27,800
Instrument Development Fund (IDF)	$3,506
Facilities Development Fund (FDF)	$31,306

Table 1-1: 2016 spending by fund, values in US$1,000

Division	FTE
Administration	17
Development	18
Operations	113
Deputy Director	13
Directorate	7

Table 1-2: 2016 Staffing

2017 will bring the full commencement of the Obsolescence Mitigation ("Regeneration") program, new data reduction cookbooks for GNIRS and FLAMINGOS-2, the installation and commissioning of new detectors into GMOS-North, the new GeMS laser at Gemini South, and the completion of the build phase of GHOST.

2 Introduction and Overview

Gemini Observatory's mission is:

To advance our knowledge of the Universe by providing the international Gemini Community with forefront access to the entire sky.

Gemini's foundation is the twin 8.1-meter telescopes on Maunakea, Hawai'i, and Cerro Pachón, Chile, with their complement of instrumentation that provides a range of broad and specialized capability across the optical–infrared bandpass, including adaptive optics. That foundation supports our multi-national astronomical user community, which includes Gemini's own scientific staff. Our users are directly responsible for Gemini's scientific achievements, pursuing interests that range from the Solar System to the most distant galaxies and structure of the Universe. Gemini Observatory provides the flexible, responsive platform that enables these advancements.

The Fast Turnaround program, which allows a wide range of scientific ideas to be turned into results very quickly, is now fully established at both Gemini North and South. It has proved very popular, and the novel peer review mechanism has been appreciated by the community. The second phase of the Base Facility Operations (BFO) project is about to conclude, and we are now operating the Gemini South telescope from the control center in La Serena, Chile, with no staff at the summit at night. BFO is part of Gemini's Transition Program, in which we restructured the Observatory to function robustly despite a budget reduction of roughly 25%. The final report of the Transition Program was delivered to the Gemini Board in its meeting in November 2016. The TP has realized a total of $1.2M in savings annually. Finally, the Development Division continued the strong progress of GHOST, the high-resolution optical spectrograph destined for Gemini South in 2018, and received proposals for the next instrument (Gen 4#3).

Section 3 describes scientific highlights from 2016. These include results from facility instruments, novel modes such as GRACES, and visiting instruments. Section 4 reports on Operations, including demand, usage and productivity. We also present summaries of user interactions, proposing and observing modes, and Observatory metrics. Section 5 discusses accomplishments in instrumentation and facility development, including progress on new facility-class instrumentation and upgrades of existing instruments. In Section 6, we review our educational programs, our efforts toward broadening participation, and our communications for users and the general public. Section 7 summarizes administration and finance. Section 8 contains the program plan for 2017.

3 Science Highlights

Resolving the Stellar Mass-Size Relationship at z=1

Sarah Sweet (Australian National University) and collaborators observed the distant cluster of galaxies SPT-CL J0546-5345 using the Gemini Multi-conjugate Adaptive Optics System (GeMS) with the Gemini South Adaptive Optics Imager (GSAOI). They found a mass-size relationship which is offset from that at the present day, consistent with size evolution proportional to $(1 + z)^{-1.25}$, as has been found in field galaxies. However, the size evolution does not appear to be a function of mass, so neither

mergers nor adiabatic expansion are responsible for this evolution. Sweet et al. demonstrate that to achieve reliable results at this distance requires infrared observations which trace the older stellar populations, and the sub-kpc spatial resolution provided at z=1 by the GeMS adaptive optics system. (Sweet et al. 2016 MNRAS, in press)[1]

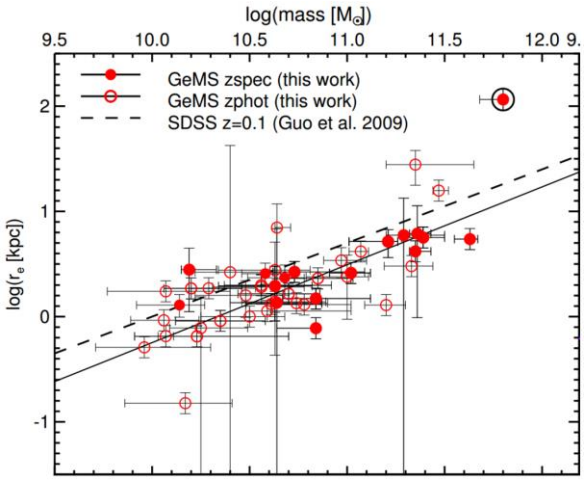


Figure 3-1: Stellar-mass, size relation for the cluster SPT-CL J0546-5345. The relation —where mass is measured in units of log(mass [M_{Sun}])—for this *z*=1 cluster is offset from the local relation (dotted) by 0.21 dex.

A Dark Matter Galaxy

The very-low surface brightness galaxy Dragonfly 44 was discovered in 2014. Fast-Turnaround observations using the Gemini Multi-Object Spectrograph (GMOS) on Gemini North, along with spectroscopic data from Keck II, reveal the galaxy's physical properties. They show that it is like a "failed" Milky Way, having similar mass, size, and globular cluster population, but lacking stars. The Keck spectroscopy enabled Pieter van Dokkum (Yale University) and collaborators to measure the mass of Dragonfly 44. Deep imaging from Gemini then yielded the galaxy's mass-to-light ratio, and also showed the large population of globular clusters in the halo. The team concludes that the galaxy's mass is approximately 10^{12} M_{Sun}, and that the total galaxy is 99.99% dark matter. (Van Dokkum *et al.* 2016 *ApJ* 828 L6)[2]

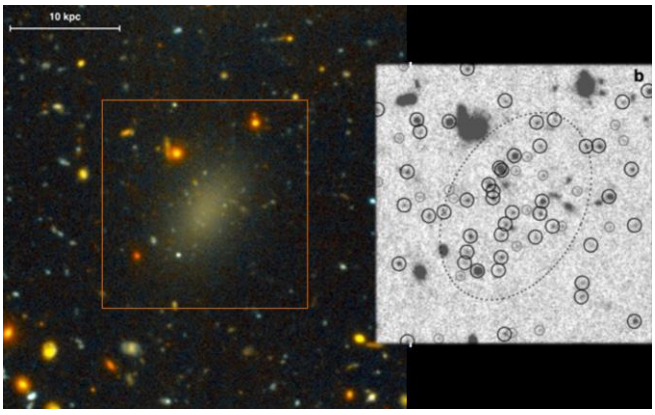


Figure 3-2: Narrow-field (left) view of Dragonfly 44, obtained with GMOS-North. The inset (right) shows the derived distribution of globular clusters.

[1] https://arxiv.org/abs/1609.06054

[2] http://iopscience.iop.org/article/10.3847/2041-8205/828/1/L6/meta

The Deepest Ground-Based NIR Color-Magnitude Diagram

Adaptive optics enables accurate and extremely deep photometry of crowded fields. Sara Saracino (University of Bologna) and colleagues measured thousands of stars in the globular cluster NGC 6624 using the Gemini Multi-conjugate adaptive optics System (GeMS) and the Gemini South Adaptive Optics Imager (GSAOI), finding an age of 12.0± 0.5 gigayears. The near-infrared color-magnitude diagrams (using the *J* and *Ks* photometry) each span more than 8 magnitudes. The team detects the main sequence "knee" for the first time in a purely near-infrared color-magnitude diagram, at *Ks* ~ 20. They find clear evidence for mass segregation, which confirms that NGC 6624 is at an advanced stage of dynamical evolution. (Saracino *et al.* 2016 *ApJ*, in press)[3]

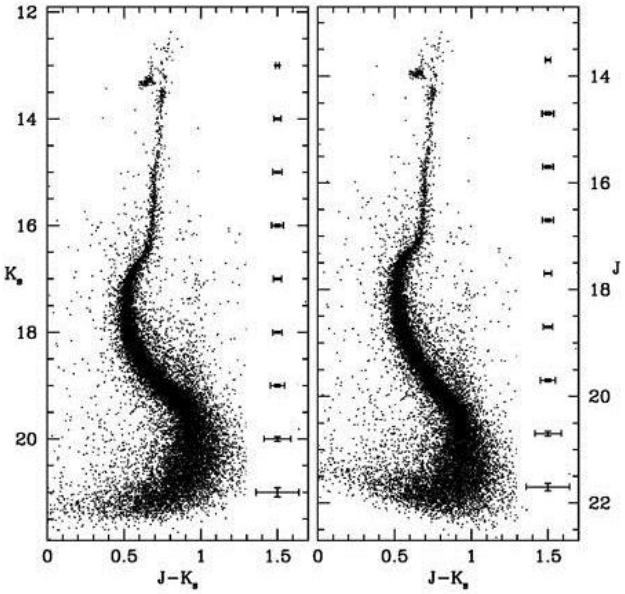


Figure 3-3: Color-magnitude diagrams of NGC 6624 span over 8 magnitudes, and show all the main evolutionary sequences. Photometric errors for each magnitude bin are shown on the right side of each diagram.

A Spectrum of the Coldest Brown Dwarf

Gemini has made spectral observations of the coldest known brown dwarf, which has a temperature of only about 250K. The object, WISE J085510.83071442.5 (WISE 0855), looks as much like Jupiter as any exoplanet discovered to date, and there is evidence for water clouds in its atmosphere. Andy Skemer (University of California Santa Cruz) led this work, using the Gemini Near-Infrared Spectrograph (GNIRS) on Gemini North. The best conditions were required to catch the weak emission, which is five times fainter than any other object detected in ground-based spectroscopy in the 5μm atmospheric window: observations were carried out in queue mode over some 13 nights spanning more than a month (Skemer *et al.* 2016 *ApJ* 826 L17)[4].

[3] https://arxiv.org/abs/1609.02152

[4] http://iopscience.iop.org/article/10.3847/2041-8205/826/2/L17/meta

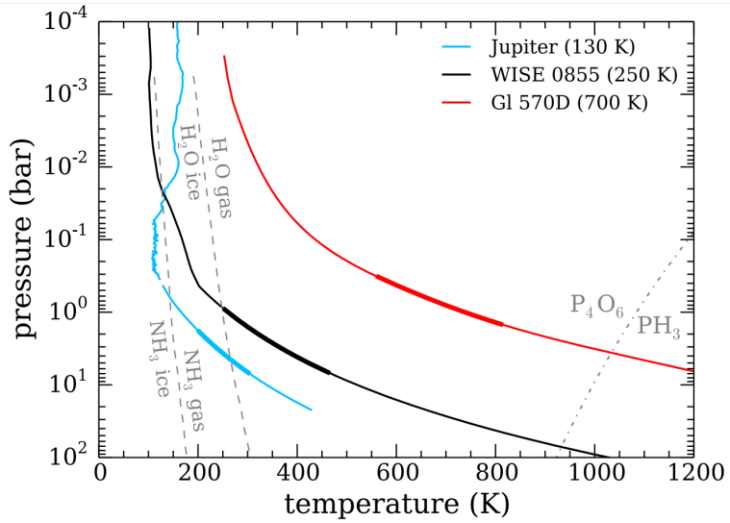


Figure 3-4: Temperature-pressure profiles of Jupiter, the cold Brown Dwarf WISE 0855, and a somewhat warmer object - Gl 570D. Thick lines mark the regions responsible for the 5μm emission.

Confirming Nearby Exo-Earths

The Differential Speckle Survey Instrument (DSSI) visited Gemini South for the first time in June 2016 and is already delivering exciting results, including the validation of nearby Earth-like exoplanets. Previous observations using the TRAnsiting Planets and PlanetesImals Small Telescope (TRAPPIST) had shown variations in the light curve of the star TRAPPIST-1, implying the presence of several Earth-sized planets. Steve Howell (NASA Ames Research Center) and colleagues used the high-resolution images from Gemini to confirm the small size and mass of these suggested planets by ruling out the presence of a very nearby companion. DSSI on Gemini provides the highest resolution optical images available to astronomers anywhere, and here achieved a resolution of 27 milli-arcseconds, or 0.32 astronomical units at the 12-parsec distance of TRAPPIST-1. (Howell *et al.* 2016 *ApJ* 829 L2).[5]

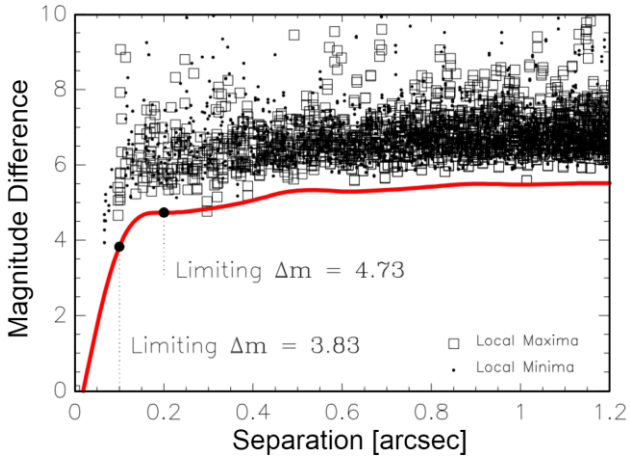


Figure 3-5: Detection limit analysis for the Gemini-South 2016 June 22 observation of TRAPPIST-1 at 883 nm. The red line represents the relative 5σ limiting magnitude as a function of separation from 0.027 to 1.2 arcsec. At the distance of TRAPPIST-1, these limits correspond to 0.32–14.5 AU. The two listed limiting magnitudes given for reference are for angular separations of 0.1 and 0.2 arcsec.

Measuring a Hot Jupiter with GRACES

Many gas-giant planets lie very close to their host stars. As they could not have formed in their present locations, questions remain: do these giants move close-in when the system is young, after interacting with the protoplanetary disk, or do they only move

[5] http://iopscience.iop.org/article/10.3847/2041-8205/829/1/L2/meta

later, following interaction with multiple planets? The discovery of a 0.77 $M_{Jupiter}$ exoplanet located within 0.06 astronomical units of the young star V830 Tauri confirms both rapid planet formation and early migration. Such early-forming "hot Jupiters" probably play a key role in shaping planetary systems overall. Jean-François Donati (Observatoire Midi-Pyrénées, France) led a program, which included Director's Discretionary Time observations using Gemini North and the visitor instrument GRACES (Gemini Remote Access to CFHT ESPaDOnS Spectrograph) in collaboration with the Canada-France-Hawai'i Telescope (CFHT). The work also used ESPaDOnS on CFHT and the spectropolarimeter NARVAL on the 2-meter Telescope Bernard Lyot. (Donati *et al.* 2016 *Nature* 634 662)[6]

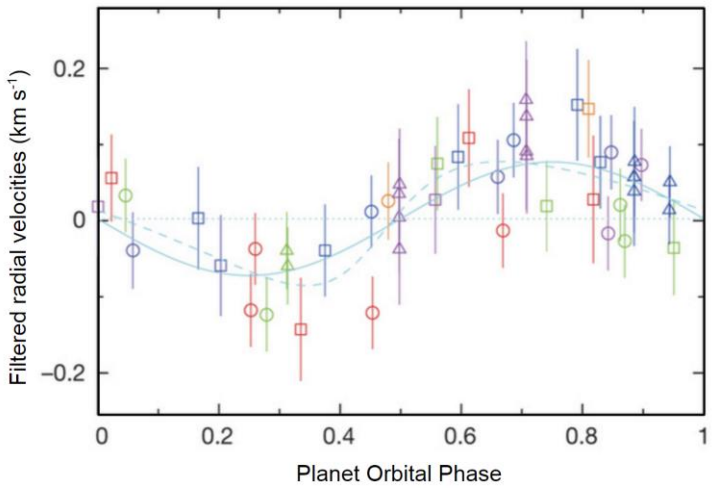


Figure 3-6: Radial velocity measurements of V830 Tauri, after filtering out stellar activity. Data from ESPaDOnS / Gemini (triangles) ESPaDOnS / CFHT (circles); and NARVAL / TBL (squares) are color-coded by rotation cycle. The best fit circular (solid line) and eccentric (dashed line) orbits are shown, with the zero radial velocity (dotted line).

3.1 Proposal and Publication Statistics

Gemini serves hundreds of Principal Investigators (PIs) each year, offering a variety of different program types and observing modes. We list the total numbers of approved programs by proposal mode for semesters 2015B and 2016A in Table 3-1. National Time Allocation Committees evaluate "Semester" programs, which once accepted, may be executed in queue or classical mode. Project titles and PIs in these completed semesters are listed in Appendix D.

As described above, Partner community astronomers use the Gemini facilities effectively to make scientific discoveries. Overall, the publication rate based on Gemini observations continues to be strong, although we may have reached a plateau. A total of 188 refereed publications were published in 2016 (Figure 3-7). 92 of these (49%) resulted from observations with Gemini South; 72 (38%) from Gemini North, and 24 (13%) from observations with both telescopes. Approximately 40% of all publications included data from more than one Gemini observing program.

The use of adaptive optics remains strong, with more than 20% of these publications utilizing Gemini adaptive optics capabilities. 15% of these 2016 publications have a Gemini Observatory staff member as lead or co-author. All Gemini staff publications are listed in Appendix B, and all publications based on Gemini data are listed in Appendix C.

[6] http://www.nature.com/nature/journal/v534/n7609/full/nature18305.html

Proposal Mode	N
2015B	
Semester	166
Large and Long	10
Fast Turnaround	37
Discretionary	10
2016A	
Semester	181
Large and Long	11
Fast Turnaround	29
Discretionary	16

Table 3-1: Number of programs per proposal mode for completed Semesters

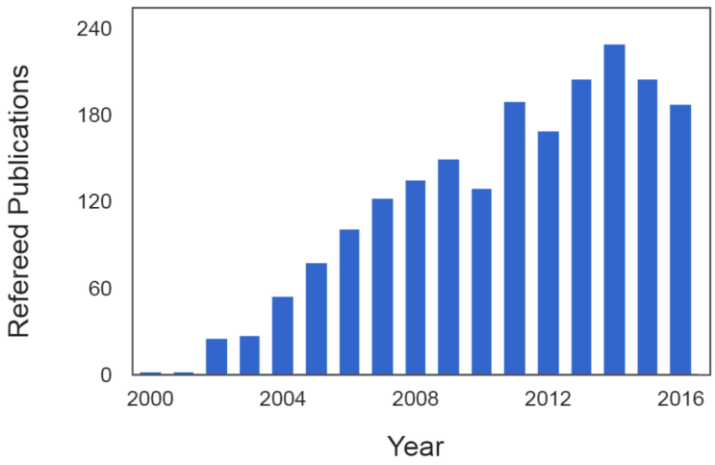


Figure 3-7: publications per year, to date

4 Operations

4.1 Operations Summary

The 2016 program plan provided a list of "regular operations" activities and tabulated specific additional major tasks scheduled for 2016. Tables 4-1 and 4-2 show those major items; the main tasks are complete. Throughout this section we describe progress with these activities, list changes and decisions taken within the year, and give highlights of the regular operations activities.

Title	Completion	Section
Develop an Observatory-wide Obsolescence Mitigation Plan	90%	4.8
Operations Software Upgrades and Obsolescence Management	70%	4.8
Science Operations Model Upgrade Prioritization	100%	4.8
Upgrade the Cerro Pachón Network Link	100%	4.8
Commission the FLAMINGOS-2 MOS mode	50%	4.2.2
Implement new post-observing communication strategy	75%	4.3
Improve data reduction software documentation and cookbooks	100%	4.3
Complete final imaging mode of QAP and release to public	90%	4.3
Quick-look tool for quality assessment of spectroscopic observations	100%	4.3
Repackage Ureka using Conda	100%	4.3
Update Gemini IRAF for new GMOS-N CCDs and F2 MOS mode	50%	4.3

Table 4-1: Major Operations Activities in 2016

Title	Completion	Section
Remedial action on NIRI and F-2 cold heads	100%	4.2.1,4.2.2
Support DSSI and Phoenix on Gemini South	100%	4.8
Port existing vibration monitoring system to Linux	100%	4.8

Table 4-2: Other Operations Activities in 2016

4.2 Instrumentation

Here we summarize operational performance of facility instrumentation over the last two complete semesters (2015B and 2016A). See section 7 for information on instrument upgrades.

4.2.1 Gemini North

GRACES

GRACES, a fiber feed from Gemini North to Espadons at CFHT, has proven to be more sensitive than HiRes at Keck for observations between 600nm and 980nm. In 2015B the instrument had two successful 10-night runs. Three successful runs from this popular instrument in 2016A resulted in 81% of the allocated band 1-3 GRACES program time being executed. Improvements to operational efficiency were made by the GRACES team.

Gemini North Laser Guide Star

Faults associated with the laser increased through 2015B, and there were serious technical issues throughout 2016A. The effects of these problems were compounded by poor weather to significantly impact the completion of science programs. We are discussing with the Operations Working Group the possibility of restricting laser programs to Band 1 until the existing laser is replaced with a Toptica system in 2018.

GMOS-N

GMOS-N has been performing well without any major technical issues. The instrument has operated without the R150 grating since June 2016, when the old grating with degraded throughput was removed. The replacement grating is scheduled to be installed in November 2016. In the second half of 2016, the incidence of “high read-noise” events increased somewhat; these had already been noted in 2015B and caused the loss of about 8 hours accumulated over the semester. We expect these issues to be remedied by the Hamamatsu CCD upgrade in early 2017.

NIRI

The facility near-infrared imager, NIRI, has suffered progressive failure of mechanisms over the past few years, resulting in the decommissioning of a number of modes. After a further failure of the aging cryocoolers in October 2015, it was determined that the standard practice of replacing only the cooler inserts was no longer sufficient and in March 2016 we opened the instrument to replace the coolers completely. In the process, two mechanisms which had failed in 2010 were restored to free motion, but these once again proved unreliable in subsequent operation. In August the NIRI pupil viewer primary position sensor failed, and this mechanism is now relying on the backup sensor.

NIFS

NIFS, the facility Near-IR Integral-Field Spectrometer, performed well throughout the reporting period. The main fault on sky was an invalid positioning of the focal plane mask in 2016A, which occasionally produced significant loss of counts in science data and calibrations. Little time was lost to this fault.

4.2.2 Gemini South

GMOS-S

The instrument operated reliably in 2015B and 2016A; though within 2016B significant bias structure was seen in one of the Hamamatsu detectors. This is still being worked on. The known problem with oil leaking from the collimator optics is still present and will require a major intervention. Inspection of science data in 2016 showed that the problem is at least not deteriorating and we now plan to carry out the work in 2017.

FLAMINGOS-2 (F-2)

The instrument went through a major and very successful repair and maintenance stand-down in May 2016. The failing cold heads were replaced and the On-Instrument Wavefront Sensor (OIWFS) was brought back to operability, although weather prevented much progress in its characterization and a later fault (after the end of the semester) returned it to remedial work. Commissioning of the MOS mode depends on the OIWFS, and is thus delayed to the end of Semester 2016B/start of 2017A.

GPI

GPI (Gemini Planet Imager) saw fairly reliable operation throughout 2015B and 2016A. Active vibration cancellation at the closed-cycle refrigerators (CCRs) has been working very well. We operated the unreliable pupil-plane mask (PPM) mechanism on a few nights in May to allow use of the Non-Redundant Mask (NRM) mode. The PPM mechanism has since been fully restored. With the practically complete removal of the vibrations from the CCR's, we have been able to test the High Order Wavefront Sensor (HOWFS). We have found that the fringes in the HOWFS are being smeared by a 100 Hz vibration originating outside of the GPI; this has been narrowed down to either the F-2 CCRs or the helium supply lines to them. More work is needed to fully understand and mitigate this problem.

GeMS/GSAOI

We executed none of three scheduled GeMS blocks in 2015B due to the major earthquake of September 2016. This seriously misaligned the GeMS laser and caused some damage in the Canopus AO bench. By 2016A, we were still suffering from variable and low laser power but attempted to resume science operations; the weather then became the limiting factor and very little science was actually carried out. The first observing block in 2016B had much better technical performance, but again was affected by weather. We look forward to 2017, which will bring with it a more reliable laser system and the potential for more regular scheduling of GeMS.

4.3 Science User Support

The Science User Support Department (SUSD) is tasked with creating a collaborative community of users and staff and consolidating post-observing support. Areas of attention include data archiving and reduction, interactions with the National Gemini Offices (NGOs), and oversight of the HelpDesk and Data Reduction User Forum systems. Increased communication and interaction is at the core of creating a collaborative community. We have been working to implement a strategy to improve communications with our users. Two projects that form the basis for this strategy were started this year:

1. We have begun to restructure the Gemini public website, making it more user-centric. The first stage of the work consists of research and pre-assessment. A

workgroup identified our audiences, elaborated a global vision statement, and drafted a website policy document. We conducted a series of usability tests on the current website, to identify the main improvements and features required to address our users' needs.

2. We plan to collect trackable and actionable feedback from Gemini users through the use of regular surveys. A short survey format (2-3 questions) will motivate a higher level of participation. The questions will be invariant each semester, so answers can be compared over time. The surveys will be timed to coincide with the four phases of the science program lifecycle (proposals, preparation, execution, data reduction) and repeated each semester. The results will be analyzed every semester beginning 2017, and monitored long term.

We have also concluded a series of technical improvements to the Data Reduction User Forum, and begun a program of care and feeding using specially-designated user contributors drawn from the community. The number of posts, and the interaction between users, continues to grow. Finally, requirements have been set for a replacement Helpdesk system. The current antiquated system is awkward to use, lacks important features (e.g. search), and is difficult to maintain.

With the completion of the Quality Assessment Pipeline (QAP) Transition Project, we have turned our primary focus to development of data reduction software for users. IRAF is growing obsolete and we are working to extend the Python infrastructure developed for QAP to meet the requirements of science-quality data reduction. Additionally, a standalone Python utility for GSAOI distortion correction and stacking (Disco-Stu) was released in August. This partially resolves pent-up demand from our user community for better GSAOI data reduction tools that specifically handle the distortion correction.

We are collaborating with STScI to repackage the STScI- and Gemini-developed software within Ureka using Conda. Use of Conda will allow the user to stay more up-to-date with third-party Python packages such as numpy and matplotlib (among hundreds of others) and decrease effort to release and maintain subsequent versions of our software. The first Gemini Conda release is scheduled before the end of the year.

In addition to improving our data reduction tools, users also request improved data reduction documentation. While addressing this in the web page project by making existing documentation easier to find, we are also working to make additional documentation available via staff authors or in collaboration with the NGOs. As part of our agreement with the US NGO to provide data reduction support in trade for phase II support, they have recently made a GMOS cookbook, FAQ, and observation preparation guide available to the Gemini community.

4.4 Storage and Archiving

The Gemini Observatory Archive (GOA) operated with essentially zero unplanned downtime since its release December 2, 2015. There has been one planned interruption of service of two hours on August 10, 2016 to release a new version that included support for GRACES data, miscellaneous file type support, some bug fixes, and minor improvements. As of late November, we have 520 registered users (it is not necessary to register to access non-proprietary data). With close to 12 million hits to date this year, typical usage is approximately 450 searches and 5GB of data downloaded per day.

The next update, to occur late in 2016, will include new features like PI name searching, publication tracking, and better support in the user interface for reduced data products.

Quarter	Queries	Site Hits	Downloads (GB)	Files ingested
Dec 2015	10941	217434	109	62765
Jan-Mar 2016	23039	495332	373	141815
Apr-Jun 2016	30376	3019684	756	116968
Jul-Sep 2016	67283	4871447	528	100855

Table 4-3: Statistics for the Gemini Archive in 2016

4.5 Special Observing Modes

4.5.1 Fast Turnaround

2016 marks the first full year in which the Fast Turnaround (FT) program operated at both sites. The program has now been used by PIs from all partner countries, and for all of the purposes anticipated when the program was originally set up. Furthermore its novel “peer review” process has given many graduate students their first experience of proposal assessment. Proposal loads, quite variable in 2015, have now settled to a level around 15 per month. Oversubscription rates are typically between 1.5 and 2. These vary because the requested conditions cannot always be accommodated and so we do not always fill the allocated 20 hours per month.

4.5.2 Large and Long Programs

In 2016A, eleven Large/Long Programs (LLPs) were active. Five more were added via the 2016 call for proposals, covering topics as diverse as main-belt comets and supernova cosmology. The oversubscription rate for observations requested by LLPs in Semester 2016B was ~6.1, comparable to ~5.5 in 2015B.

All active LLPs submitted annual reports to the LLP time allocation committee (LPTAC) in late April. The LPTAC recommended that two programs be granted extensions through 2018A; these were accepted by the Gemini Director. In Semester 2015B, 93% of the allocated LLP time at Gemini North was executed (excluding targets of opportunity). 60% of the allocated LLP time at Gemini South was executed, consistent with completion rates in the regular queue and reflecting a very difficult semester with instrumentation problems and the impact of the September 2016 earthquake. In Semester 2016A, 91% of the allocated LLP time at Gemini North was executed, excluding ToOs. 57% of the allocated LLP time at Gemini South was executed, quite a good return in a semester in which fully 55% of the observing time was lost to weather. In the second half of 2016, a quarterly LLP newsletter was launched to provide an additional, regular, means of communication to our existing LLPs. The newsletter reminds LLP PIs of upcoming deadlines, offers information on Gemini processes and procedures impacting LLP programs, etc.

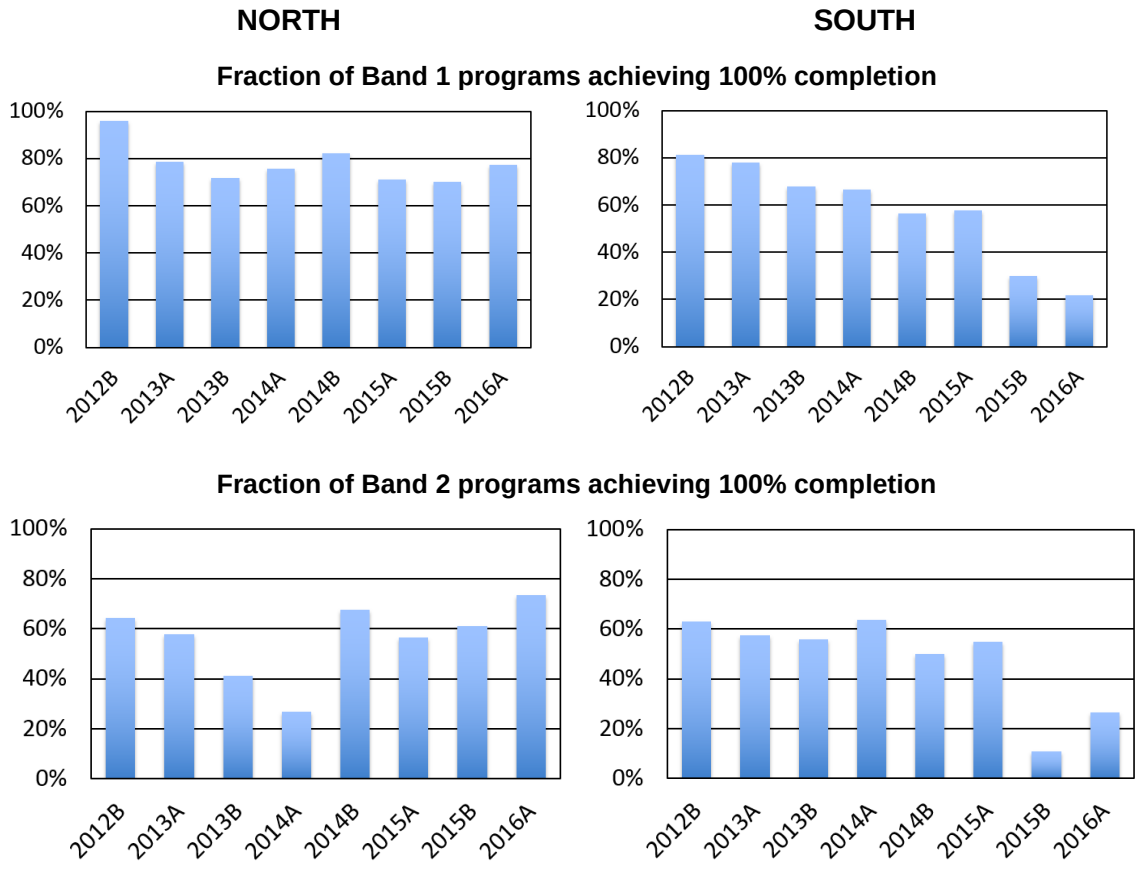
4.6 Telescopes and Enclosures

Gemini’s domes have two shutter panels: the larger, upper panel which covers the majority of the dome slit when closed, and the smaller, lower panel which covers the lower part and pulls up the wind blind when moved upwards. In August 2016, a drive box bearing on one side of the Gemini North lower shutter failed. It was repaired over a 3 week period, using a spare drive box. No science time was lost to the repair, as we

brought forward work from the scheduled October maintenance shutdown. The drive box on the opposite side of the shutter was inspected, and its bearings were also showing signs of premature wear. On the basis of calculations of expected lost time, we determined that it would be better to pin the bottom shutter in a parked position and defer the long shutdown required to effect a complete fix until mid-2017. Until then, we will operate without wind blind protection. After the upper shutter drive box failures of 2014, we redesigned the torque arms which relieve stress on the bearings; this design was prototyped at Gemini South and has been installed and trialed there. In mid-2017 we will also install these new torque arms at Gemini North.

4.7 Operations Metrics

The statistics in this section refer to demand and performance in the last two complete semesters: 2015B and 2016A, given in some cases in context of recent years. First, Figure 4-1 shows program completion rates in the regular semester queue. The major problems encountered in Chile due to the 2015 earthquake and the loss of more than half of the 2016A semester to weather caused very low completion rates at Gemini South. In the North, Band 1 completion rates are stable and the completion rate in Band 2 has rebounded well from its low in 2014 (due to the impact of shutter failures).



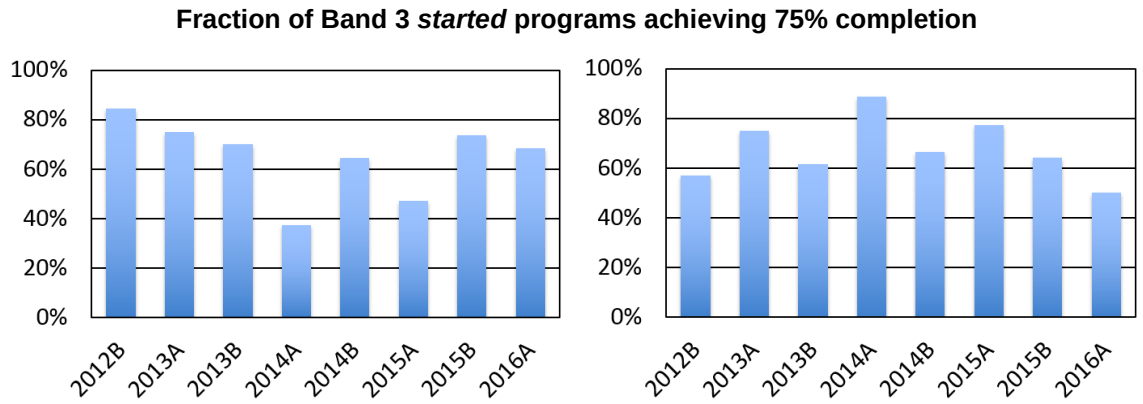


Figure 4-1: Completion statistics for GN and GS. 2015B and 2016A are represented by the bars at the right of each group. Band 1 completion rates in the final two semesters will increase as some Band 1 programs have rollover status.

4.7.1 Telescope Time Usage

Tables 4-4 and Table 4-5 show top-level time and fault distributions and science usage in the most recent two complete semesters.

Semester	Site	Science	Engineering & Commissioning	Weather loss	Fault Loss	Shutdown
2015B	North	66%	2%	24%	3%	5%
	South	40%	2%	40%	3%	15%
2016A	North	77%	1.9%	18%	2.8%	0.0%
	South	41%	1.9%	55%	1.4%[a]	0.6%

[a] This number may be artificially low due to the cancellation and weathering-out of observing with more recent and more challenging instrumentation

Table 4-4 : Overall operational statistics, semesters 2015B and 2016A

Semester	Category	North	South
2015B	Computer/Software	13%	7%
	Instruments & AO Facilities	45%	26%
	Telescope and enclosure	42%	67%
2016A	Computer/Software	13%	15%
	Instruments & AO Facilities	58%	52%
	Telescope and enclosure	29%	33%

Table 4-5: Categorized fault distribution, semesters 2015B and 2016A

4.7.2 Regular Semester: Oversubscription and Demand

Oversubscription rates in the regular Semester process are shown by Partner in Figure 4-2. These rates are calculated as the ratio of the total time PIs request to the total advertised available science time. These rates do not account for the time required for standard calibrations. Such calibrations vary by instrument, resulting in an effective factor of between 5% and 10% that is not part of the oversubscription rates shown. (The difference between the telescopes is a consequence of the different instruments used, with the infrared instruments generally having larger overheads for calibration.) In addition, because programs are approved to fill 80% of the queue time available, these values further underestimate the effective oversubscription (*i.e.*, a proposer's success

rate) by a factor of 25%. The distribution of time requested by instrument is shown in Figure 4-3. Note the significant fraction of Gemini North taken by visiting instruments (DSSI and TEXES) in the B Semester.

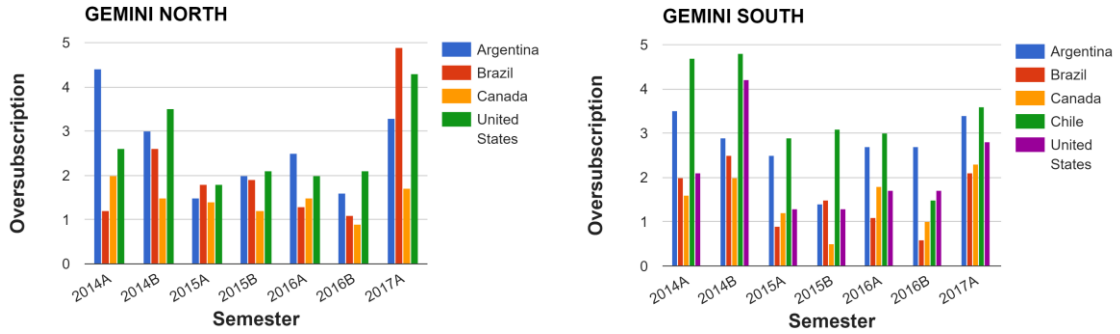


Figure 4-2: Oversubscription by partner over the last three years. 2017A values are provisional as submissions have only just been made. Note that Chile has access only to the South.

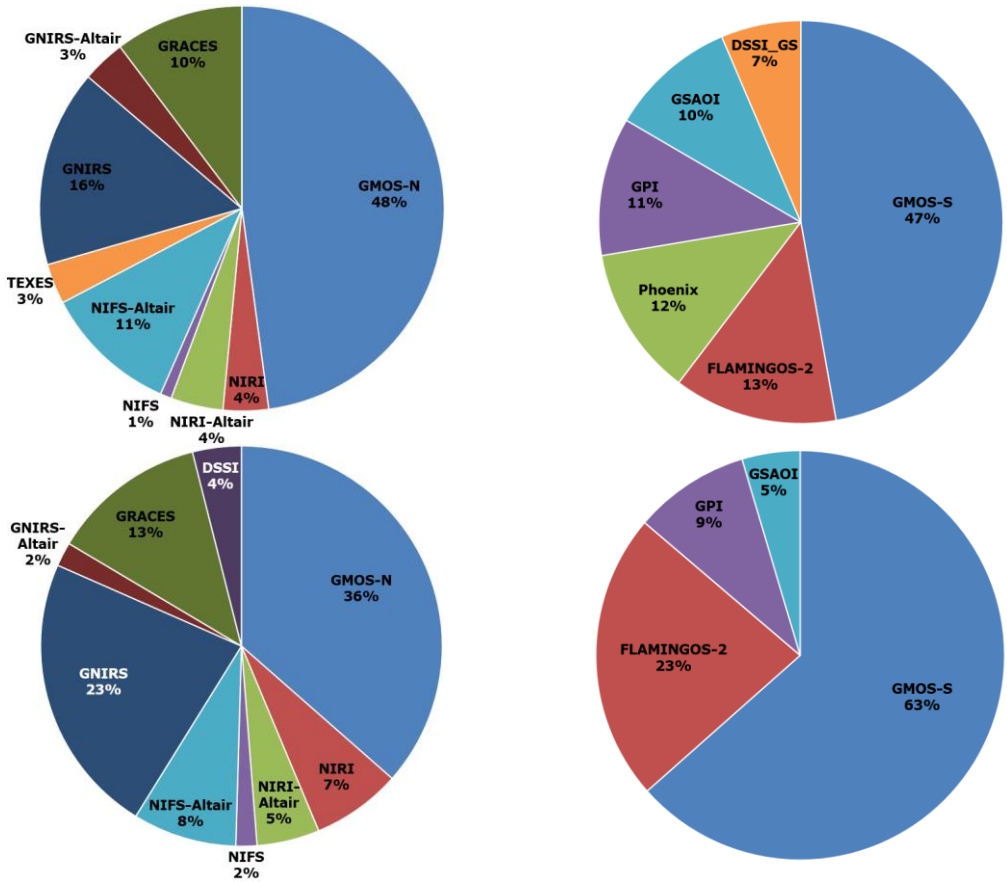


Figure 4-3: Distribution of demand by instrument, for Semester 2015B (upper) and 2016A (lower).

4.8 Other Operations Activities

Visiting instruments

We continued to welcome visiting instrumentation to both telescopes. In 2016, Phoenix had its first run as a visitor at Gemini South, and DSSI, used successfully on Gemini North since 2012, made its first visit to Gemini South in 2016A. In November, a new instrument (POLISH-2) visited Gemini North. This instrument is designed to enable parts-per-million polarimetry, with the science goal of detecting scattered light from exoplanetary atmospheres.

Science Operations review

A review of Science Operations was carried out in 2015 and early 2016, with all reports from the six working groups completed by mid-year. The Directorate then carried out a process of prioritization, resulting in a first round of changes and improvements. These are in most cases already either under way, or in preparation for activity in 2017.

BFO

Operations from the base in Hilo continued throughout 2016. No significant time has been lost. Operations from the base in La Serena commenced in November 2016. In preparation for the start of Base Operations in Chile, we installed a new microwave link between La Serena and Cerro Pachón; this is preliminary to the installation of the LSST fiber link which we now expect to be able to access in 2017.

Visiting observers

In 2016 a total of about one month per semester has been carried out by visiting observers, either Large/Long program PIs in Priority Visitor (PV) mode or visiting instrument teams) at both telescopes. In PV mode, there does not appear to be any significant difference in data quality between visiting observers and staff.

Obsolescence mitigation

After more than 15 years of night-to-night operation, Gemini's telescopes and associated systems face numerous obsolescence issues which must be dealt with to ensure future efficient and fault-free observing. In the first half of 2016 Operations and Development produced a plan which laid out the currently-known obsolescence issues, outlined and costed the work to be done to address them, and briefly described how a future rolling obsolescence program will work. This plan was described in a report to NSF in July 2016. In an ongoing project dealing with obsolescence in the Real-Time systems, we completed the consolidation of common software libraries for the real-time systems, with a final review in October. With this in place, the upgrade stage has started. We plan to complete the upgrade of the simpler systems (Weather System, Acquisition and Guidance Sequencer, Calibration Unit) by end of 2016, as originally planned.

Vibration Monitoring

Monitoring equipment similar to that employed in the North has been procured, readout of the accelerometers under Linux has been completed. The system is being readied for installation on Gemini South in 2017. Once that is done, we will retrofit the computer and software to the North, where the initial prototype computer system has proved somewhat unreliable.

4.9 Transition Program

The objective of the Transition Program (TP) is to produce a sustainable, scientifically competitive observatory running sustainably on an operations budget that has had its buying power reduced by nearly 25%. Since 2013, we have been implementing spending reductions of $6.5M compared with the 2012 budget. Gemini management examined the Observatory's core mission, identified the required principal services, and restructured the operations accordingly to define the program.

Financial savings result from three TP activities:

1. Reducing staff ("Labor" in Fig. 4-4);
2. Generally reducing non-labor expenses where possible ("General non-labor" in Fig. 4-4)
3. Implementing projects either to support operations with a smaller staff or to achieve additional yearly savings ("TP non-labor" in Fig. 4-4)

During 2016, four Transition Program projects remained active: *Base Facility Operations* implementation at Gemini South, *Gemini North Energy Savings*, *Gemini South Energy Savings*, and *Reduce Base Facility Expenses*. As of the end of 2016 only the *Gemini North Energy Savings* remains incomplete. We closed the Transition Program at the end of 2016, and delivered a closure report to the AOC-G and the Gemini Board at their November 2016 meetings. In the following we briefly summarize the deliverables from the program, as well as its cost and lessons learned.

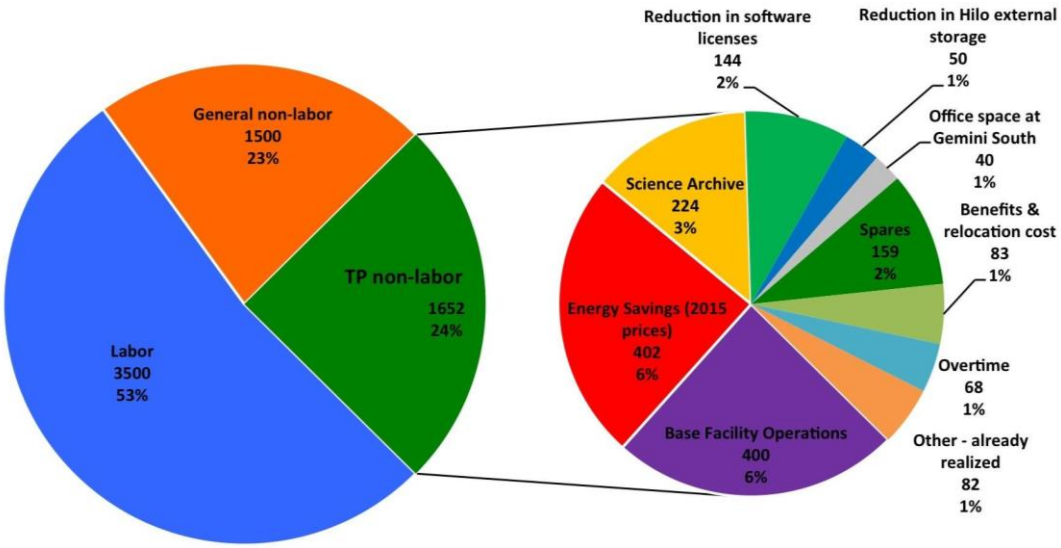


Figure 4-4: Distribution of the O&M budget reductions; amounts are in $1000. The savings from the Transition Program projects ("TP non-labor" on the left) are detailed on right.

4.9.1 Staffing Reductions

We are currently very close to the post-TP staffing. The total staffing is planned to be 174 FTE, while the actual staffing before the start of the TP (2011) was 201 FTE. The reduction results in operational changes in all divisions. The staffing will support only four facility instruments plus an AO facility at each site, and we will not have the capacity for major instrument refurbishments or development in the O&M budget. Non-research staff carries out most of the queue observing. Support for development of data reduction

software is reduced. Administrative support is reduced at the sites, while procurement, accounting and human resources have been moved to AURA Centralized Administrative Services.

4.9.2 General Non-Labor Budget

Reductions in non-labor budgets not related to Transition Program projects are enabled primarily through two channels and were required to result in savings of about $1.5M annually:

1. Reductions in staff led to reductions in spending on computers, and supplies & materials directly related to staff numbers.
2. Clear principles for budgeting non-labor expenses as well as top-level reductions were put in place in 2013.

The difference between 2013 actual expenses and the 2016 forecast is ~$2.8M. This includes the savings from the TP projects of $1.1M, showing that the general non-labor budget has been reduced by ~$1.7M, more than meeting the requirement of $1.5M reduction. A similar calculation for the 2017 budget shows a reduction of $1.5M again meeting the required reduction on the general non-labor O&M budget.

4.9.3 Transition Program Projects

In Figure 4-5 we show the status of the annual non-labor savings as of the end of 2016Q3. The savings are at $1.2M annually (red line). By the end of 2016Q4 we expect another $325k in savings from a combination of GS BFO, Gemini North (GN) energy savings project, and the Southern Base Facility (SBF) lab-to-office conversion.

The Transition Program strategic map (Figure 4-6) shows the status of the projects as of December 2016. Only the GN energy savings project will run into 2017 as we establish contracts for the installation of the fluid cooler and chiller at the Maunakea summit facility and the upgrade of the Hilo Base Facility A/C units.

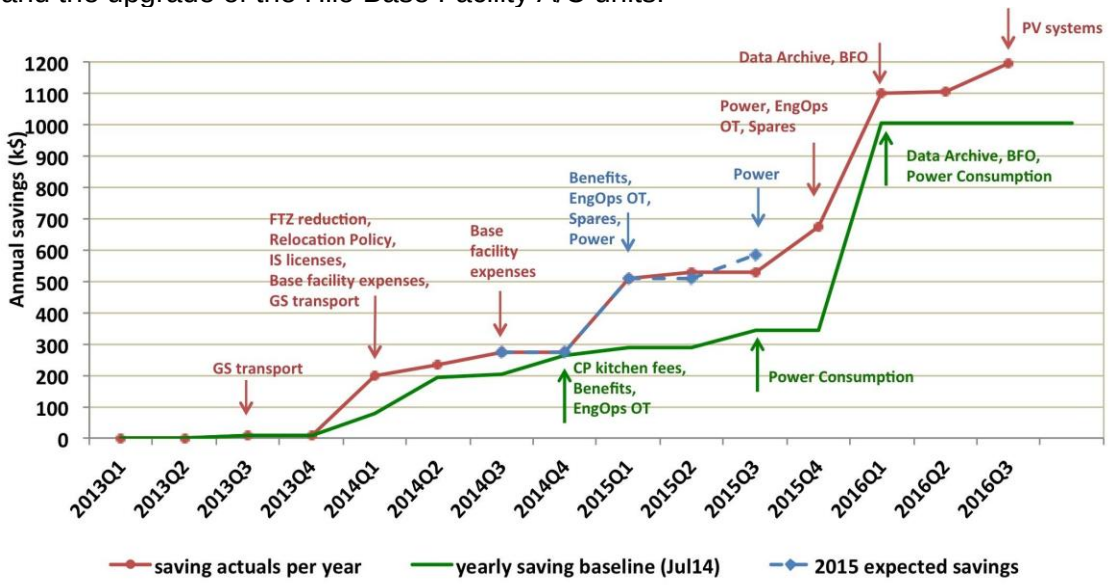


Figure 4-5: Transition Program non-labor savings. Savings at end of 2016Q3 is $1.2M annually (red solid line). The green line shows baseline savings planned, including discounts for confidence at the time of planning.

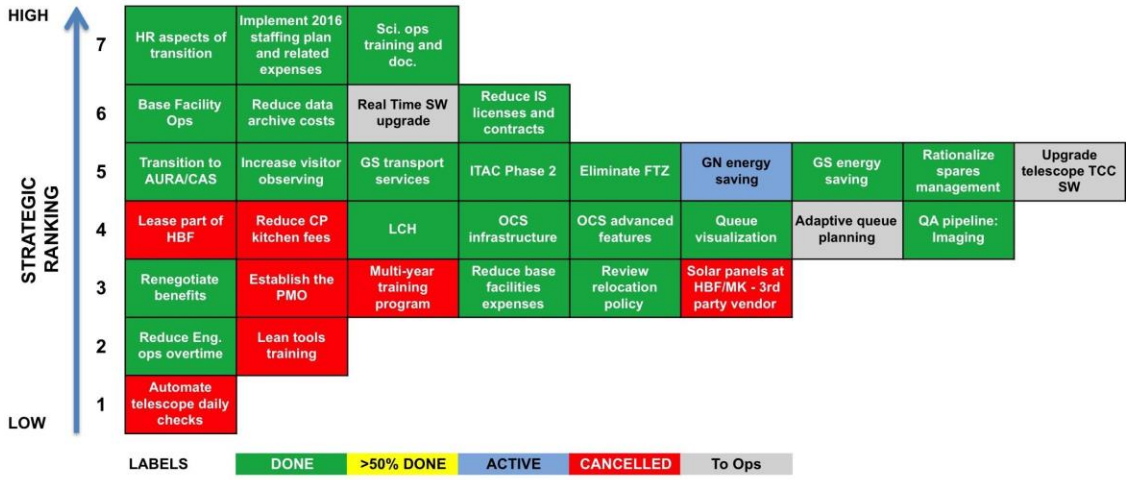


Figure 4-6: Transition Program strategic map as of December 2016.

Base Facility Operations

The implementation at Gemini South is essentially complete. Base facility operations started in mid-November. Formal closure of the project will happen in January 2017.

GN/GS Energy Savings

We have completed the installation of the photovoltaic panels at Cerro Pachón and at the Hilo Base Facility (HBF). At Gemini North, the lighting has been changed from CFL to LED lighting, and all transformers have been replaced as planned. We have the complete engineering design for the work on the Gemini North cooling equipment (summit chiller replacement and HBF air conditioning system). The installation of this equipment will be done under separate contract during 2017.

Reduce Base Facilities Expenses – Gemini South lab-to-office conversion

We have converted the instrument lab at the SBF to offices, enabling us to vacate Casa 8 and Casa Verde and save the related rent and utilities on these buildings.

4.9.4 Cost of the Transition Program

The Transition Program total cost was tracked as non-labor and labor effort. Full tracking using dedicated accounts and timecard categories was put in place by 2013 Q4. Table 4-6 summarizes the total cost in each the six accounts and timecard categories. The 2013 labor effort accounting is incomplete as the tracking was put in place late in the year. We estimated for the 2013 annual report that a total of 10 FTE were used in 2013 on TP projects (2013 Annual Report, Table 7.2). The 2013 effort was primarily spent on BFO, QAP, and software TP projects, though we do not have detailed information on the distribution.

TP Account	Non-Labor / $k					Labor / FTE					Total Cost / $k
	2013	2014	2015	2016	Total	2013	2014	2015	2016	Total	
BFO	50	237	368	281	936	1.6	7.5	13.0	5.6	27.8	3711
Software	7	136	76	6	225	1.9	3.3	4.1	0.1	9.3	1158
Engineering		56	693	3017	3765	0.0	0.7	1.5	1.9	4.1	4177
Science			6		6	0.8	2.2	3.7	0.0	6.7	679

Admin	15	5		202	222	0.0	0.3	0.6	0.2	1.1	332
Management	27		52		80	0.3	1.9	1.3	0.3	3.8	457
Total	**99**	**434**	**1195**	**3506**	**5234**	**4.6**	**15.9**	**24.2**	**8.1**	**52.8**	**10513**

Table 4-6: Cost of the Transition Program

4.9.5 Lessons learned from the Transition Program

The Transition Program Closure report contains detailed descriptions of the lessons learned from the program. Here we briefly summarize these.

- Manage as a program: The TP was originally managed as a collection of individual projects rather than as a program. Program management was put in place by mid-2014 with the change of the TP Executive.
- Manage projects with project managers. Successful program and project execution relies on consistent project management training as well as mentoring for the project managers
- Plan for staff turnover and delay in hiring of temporary staff.
- Realistic estimates of effort. In particular, the software effort was underestimated for the Transition Program.
- Definition and use of risk ledger: Ensure risks are actionable.
- Definition of program dashboard to provide a balanced view of the program progress.
- Tracking of project cost, enabling feedback on resource use as well as cost benefit assessments of projects.
- Tracking of realized benefits, in addition to non-labor savings.
- Communication to the staff: include updates on major programs in the all staff meetings

4.10 Administration and Facilities

The Administration and Facilities Group (AFG) in the North and South provided a wide range of administrative and facility support services to employees and telescope users. The Observatory achieved significant advances in diverse AFG categories in 2016. We cite two examples: electrical energy systems in Gemini North and facilities infrastructure in Gemini South.

Energy projects at the Hilo Base Facility (HBF)

Gemini continues to review energy trends and seek opportunities for energy saving initiatives. Energy savings and reduced electricity costs were achieved through a number of work packages in 2016. Photovoltaic panels installed on the HBF started to deliver savings of 20% in GN electricity usage. Newly installed LED lighting and energy efficient transformers are starting to deliver a savings of $9k annually. Seven air conditioning units will be replaced with energy efficient units in 2017.

Facilities improvements at the Southern Base Facility (SBF)

In 2016 two new Stulz air conditioning units were installed in the SBF data center, reducing energy consumption by 58.19%. One unit acts as a backup system that runs on UPS power should the primary unit fail. The SBF's building HVAC system was replaced with a more efficient system, saving Gemini 50% in running costs.

In November 2016, construction finished on 17 new offices and a refurbished instrument lab, created in the space formerly occupied by the SBF's original instrument lab. This

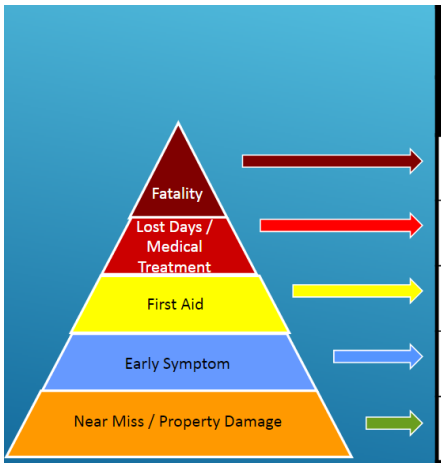
enabled vacating the staff from offices in Casa 8 and Casa Verde. Accommodation of 17 extra staff in the SBF main building as well as compliance with health and safety regulations mandated extensions to the current male and female restrooms. These were also completed in 2016.

Under construction is a 25m^2 extension to the existing instrument lab into the service yard to meet the future needs of the GS Engineering and Development teams. Gemini worked with AURA CAS procurement in establishing an open and transparent bidding process to award this work to an external contractor. The payback period for this project is estimated at 4.4 years.

Overall, this SBF facilities improvement project will provide savings of $40,000 per year, improve staff interaction, and reduce security risks.

4.11 Safety

The Safety team worked closely with staff and supervisors during 2016, achieving a further reduction of the number safety incidents and resulting lost time (see Figure 4-8). Completion of Level A Safety Awareness training increased to 70% in 2016; this was the result of improved training materials and managerial actions promoting compliance.



	YTD 2016		2015		2014		2013		2012		2011	
	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days
Fatality	0	0	0	0	0	0	0		0		0	
Lost Days / Medical Treatment	1	0	2	5.5	1	7	2	28	2	185	0	0
First Aid	6	0	3	0	1		1		6		0	
Early Symptom	0	0	1	0	1	0	0		1		0	
Near Miss / Property Damage	3	0	6	0	7	0	3		5		12	

Figure 4-8: Safety incidents for the period 2012 – 2016

As part of the security plan and to support the core value of keeping the safety of people and assets, the Observatory continued training staff on emergency response procedures. Gemini introduced electronic access control at the Gemini South base facility to increase security.

4.12 External Relations

Gemini Observatory remains committed to supporting our users with the broader goal of producing scientific results. We assist them throughout the scientific lifecycle, from initial idea through analysis, leading to final publication of results. As Gemini provides public access to diverse scientific users around the world, we aim to make the Observatory and its capabilities as accessible as possible. We describe here high-level activities between Gemini and our users and Partner countries. We describe the regular communications program for users and the general public in Section 6.3.

In mid-2016, the Gemini Director made an extended “Road Trip” within the US, to provide general information about Gemini’s new operations, instruments, and opportunities. A total of six Institutions were visited:

- University of Maryland
- Penn State University
- University of Texas at Austin
- Texas A&M University
- University of California, Berkeley
- University of California, Santa Cruz

Members of the Gemini Directorate make an effort to attend the national astronomy meetings of our Partners. In 2016, several members attended the American Astronomical Society meeting in Florida. The Deputy Director attended SOCHIAS (Chile) in March and SAB (Brazil) in August; the Director attended CASCA (Canada) in June; and the Associate Director for Operations attended the AAA meeting (Argentina) in September.

We also supported the Gemini Board in their development of Gemini’s strategic vision, setting up a web survey and providing the results for analysis; this information was reported upon at the November 2016 Gemini Board meeting.

Finally, the Director led the work which culminated in signed limited-term partnership Agreements with KASI (for 2017 & 2018) and AAL (for 2017).

5 Instrumentation and Facility Development

The Development Division has three parts: the Project Support Department, the Technology Development Department, and the Program Support Group. Together, they deliver new and upgraded scientific capabilities to the Observatory through our instrumentation, adaptive optics, and technology development programs and support Observatory operations and improvements through our telescope scientist, project managers, and systems engineers.

The Instrumentation program is able to support two large and two smaller efforts each year. In 2016, we saw the Gemini High-resolution Optical SpecTrograph (GHOST) enter the build phase and completed the proposal selection process for our next new instrument, Gen 4#3. We are completing work on the GMOS-N CCD upgrade, with plans to install in early 2017, and we continue our instrument upgrade program with our second annual call in September.

Our adaptive optics (AO) program works to stabilize and improve our adaptive optics facilities, making them accessible to all users, and also maintains telescope performance to deliver seeing improvements for all Gemini observations. This year, we focused on procuring new lasers for both the Gemini South and Gemini North AO systems, along with a new natural guide star sensor (NGS2) for the Gemini Multi-Conjugate Adaptive Optics System (GeMS).

5.1 GHOST

GHOST will provide simultaneous, high-resolution spectroscopy with R > 50,000 (for two objects plus sky) and R > 75,000 (for one object plus sky only) from 363 to 950 nm. We currently estimate GHOST will be available to the Gemini community for science use in 2018. The GHOST team — Australian Astronomical Observatory (AAO), National Research Council of Canada Herzberg (NRC-H), and the Australian National University (ANU) — completed its final design review in May, 2016 and the instrument is now in the build phase.

5.2 Gen4#3

Following on the successful completion of the Gemini Instrument Feasibility Studies process, we launched the request for proposals for the design and build of Gen 4#3, our next new facility instrument, in December 2015 and received four proposals by the end of August 2016. After an extensive review process, we started final contract negotiations in November. Gen 4#3 will be a broad-wavelength-coverage (at least 0.4 to 1.6 microns), moderate resolution (R~4000) spectrograph designed to capture its entire spectral range simultaneously. We aim to start the Conceptual Design Stage in early 2017.

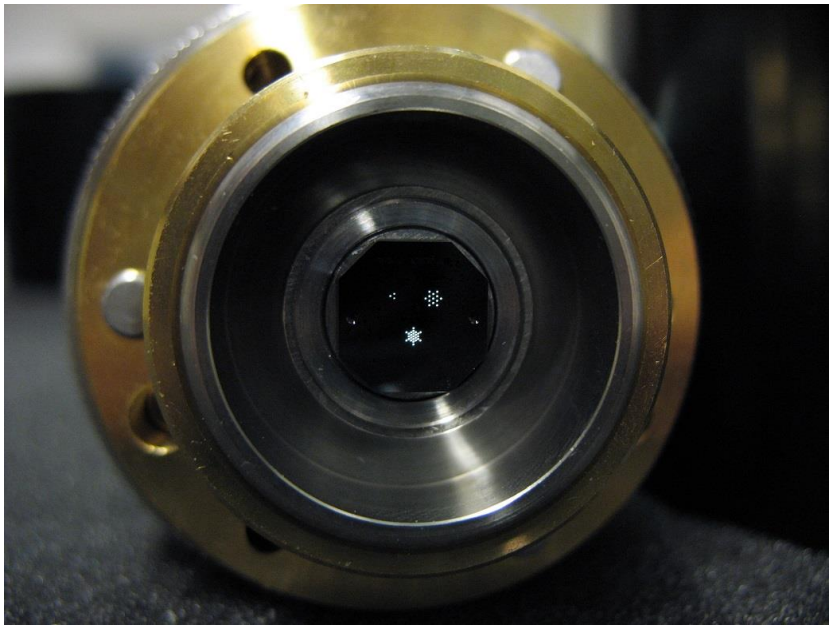


Figure 5-1: The IFU end of one of the GHOST prototype optical cables, completed in 2016. Seen here clockwise from the upper left are the low-resolution sky, low-resolution object, and high-resolution object IFU bundles.

5.3 GeMS

Improved Astrometry

We are pursuing two internal efforts to provide better astrometric calibrations for GeMS. The one closest to implementation is a pinhole mask used prior to each observation to map static astrometric aberrations in the system. We have tested this system in the lab in 2016 and plan to test in GeMS in early 2017.

GeMS Laser

The primary aims for purchasing a new laser for GeMS are to increase its availability and to decrease its support requirements so we can offer GeMS more routinely at Gemini South. In February 2016 we selected Toptica Photonics as our laser supplier. We completed a factory acceptance readiness review in September 2016. Toptica shipped the laser on December 2nd to Cerro Pachón where it arrived safely on December 13th, with none of its 8 shock sensors activating in transport. After installation, configuring, and testing on site, we expect to commission the new laser by August 2017.

NGS2

Throughout 2016, we worked with ANU to deliver a new "Natural Guide Star Next Generation Sensor" (NGS2) to GeMS. The goal for the project is to improve our limiting guide star brightness to enable more sky coverage, while making the system easier to use and support. The ANU team is building a new system to meet these objectives using an EMCCD (electron multiplying charge coupled device) camera built by Nüvü Camēras. We are holding an acceptance review in December 2016 that includes the hardware and some or all of the associated software and documentation. We plan for installation in late 2017, after we commission the new laser, pending a successful review in December.

DM0

GeMS was designed to have three Deformable Mirrors (DMs), conjugated one each at 0, 4.5, and 9.0 km, but during the commissioning, DM0 failed. GeMS now operates with only two DMs (using the former DM4.5 to conjugate at ground level and become the current DM0). A failure of one of the remaining DMs would leave the system either inoperable or delivering very poor performance. In 2016, we completed and oversaw two related contracts to provide a new DM from Xinetics and electronics from Cambridge Innovations. We expect to complete acceptance testing in 2017. Once received, the new components will serve as spares until we have available resources from our other GeMS work (the new laser and NGS2) to install and bring GeMS to its full three-DM configuration, likely in 2018.

RTC

The GeMS real-time computer (RTC) is a complicated piece of hardware that is starting to show some signs of age and operating issues. In 2017, we will study ways we can improve the reliability of the current system or replace it entirely.

Overview

Table 5-1 outlines our expected workplan and major risks for GeMS.

Milestone	Date	Major Risks
Static astrometric mask installed	2017Q1	Staff and system availability for testing without rising operational commitments.
Laser commissioned	2017Q3	Insufficient software effort
NGS2 installation	2017B	Additional work needed after 2016 acceptance testing.
DM0 installation	2018Q2	Delays in any of the above projects
Gems RTC upgrade	TBD	Resource availability

Table 5-1: Timeline and risks for GeMS development work

5.4 GMOS CCDs

The GMOS CCD upgrade project aims to replace the detectors of both GMOS instruments (there is one at each Gemini telescope) with high-efficiency, fully-depleted CCDs from Hamamatsu. With some additional debugging in 2016 after their 2015 installation, the GMOS-S CCDs continue in standard operation. The GMOS team mounted, tested, and characterized the new CCDS for the GMOS-N instrument for installation planned in February 2017.

5.5 Instrument Upgrades

In order to keep our current instruments competitive as they age and to provide more opportunities for community instrument teams and scientists to work with Gemini, we launched an instrument upgrade program in 2015. In December of that year, we selected a project to add some additional filters to FLAMINGOS-2 that split the K-band. We expect to offer the new filters to the community by 2017B.

In September 2016 we released our second annual call, increasing the funds available to $600,000 USD to allow for more ambitious projects than did our 2015 call. Going forward, our baseline plan is to have annual calls with funding alternating among $100,000 USD and $500,000 USD every year. The 2016 proposal deadline is December 2016 and we hope to start the new projects by the end of 2017Q2.

5.6 Altair

In 2016 we received a replacement dichroic for ALTAIR that extends into the L and M bands, for use with NIRI and GNIRS. This complements the new dichroic we received earlier that allows the use of GMOS-N with ALTAIR. Aided by a new Adaptive Optics Fellow at Gemini North, we plan to commission both dichroics and start a project to replace ALTAIR's aging real-time computer in 2017.

In 2016 we also completed an agreement with Toptica Photonics to purchase an additional laser, like the one ordered for GeMS, for use at Gemini North. The current laser, although sufficient power-wise, is requiring an increasing level of maintenance to keep it running. The new laser will allow us to consolidate spares and expertise, not only among both Gemini sites, but cross-institutionally as well, with ESO, Keck, and Subaru who are also procuring Toptica lasers for their AO systems. We expect delivery of the Altair laser by the end of 2017.

5.7 Additional Development Projects

Our plans to upgrade the Acquisition and Guiding (A&G) units at each site and the detector controller for GNIRS and NIRI remained largely on hold in 2016, due to competing higher priorities. Our planned A&G work includes replacing the obsolete mechanism controllers, and enhancing the performance of our wavefront sensors. We did some testing of our selected A&G mechanism controller to verify that it could control the needed mechanisms. With the GMOS CCD upgrade work completing in early 2017, we will be able to make more progress on both the A&G and GNIRS controller efforts in 2017.

6 Public Outreach and Broadening Participation

Gemini's Public Information (PIO) and Outreach office maintained its strong commitment to core communications efforts and outreach/education programming over the past year, while innovating to meet new and ever-evolving needs. Central to our communications activities is the dissemination of information to our scientific user community through e-publications, social media, conferences, and hard-copy publications. Our non-scientist public audiences benefited from social and electronic media, and local host community outreach programming which grew in breadth and diversity over the past 12 months. An example of the impact from both user and public communications is shown in the high-impact coverage we obtained such as illustrated in Figure 6-1. Also of particular note is a new (Version 2) of Gemini's career brochure which now includes in-depth career profile sheets of selected staff designed to inspire participation in observatory STEM careers by local students and under-represented populations.

Figure 6-1: Gemini North telescope featured on October 15, 2016 as the Astronomy Picture of the Day (APOD). Photo by Joy Pollard of Gemini's PIO staff.

Gemini's PIO efforts highlighted below demonstrate how we effectively engage our users, staff, the public, and our local host communities in the Observatory's scientific and technical work.

6.1 Outreach Programming

6.1.1 Journey Through the Universe & Viaje al Universo

2016 saw the effective delivery of Gemini's flagship local outreach programs to large and diverse audiences in our local host communities in Hawai'i and Chile. The annual *Journey Through the Universe* and *Viaje al Universo* in Hawai'i and Chile respectively, are defining programs for Gemini's local outreach programming and have been ongoing for many years. Both programs continue to grow and diversify (Figure 6-2) in both scope and duration with observatory careers and longer-term impact on students and teachers dominating our efforts during the past year. In 2016 these two programs both expanded well beyond the "traditional" week-long set of activities and now include an extended StarLab portable planetarium programming element for kindergarten and first graders in Hawai'i. In addition, multiple career-awareness events, including very popular Observatory staff Career Panels in both Chile and Hawai'i, are promoting STEM careers

in our host communities (see next section on broader career awareness activities). Work was also initiated in 2016 to establish a formal evaluation of our STEM career awareness programming impact and effectiveness, which will be implemented as a key addition to our program plan in 2017.

Figure 6-2: Gemini South's Erich Wenderoth speaks to a public audience at the University of La Serena in Chile as part of the extended Viaje al Universo local outreach programming in 2016. During this presentation a video link to the Gemini South control room was established so the audience could experience an insider's perspective on Gemini's facilities and operations.

6.1.2 StarLab Portable Planetarium

Over the prior 12 month period Gemini's StarLab portable planetarium programming has operated completely in a "train and loan" mode where Gemini staff train educators on using the equipment, as well as relevant content in modern astronomy. In addition the equipment has been upgraded to the latest projection system and redundancy to assure reliability in the field. As part of this transformation, Gemini South PIO staff are now producing a monthly sky map for central Chile (Figure 6-3).

6.2 Career Resources

A significant (and growing) component of Gemini's outreach programming is our focus on STEM careers and the participation of local students in the future STEM professional workforce. Over the past 12 months new versions of our two "Career Brochures" (English and Spanish) were produced, printed and made available online – along with new video interviews of selected staff. These are available at: www.gemini.edu/careers. To augment the brochures, a new initiative to produce in-depth career profile sheets is nearing completion; a sample is shown in Figure 6-4. By the end of 2016 we expect to have at least four new in-depth career profiles and more profiles are included in our program plan for 2017.

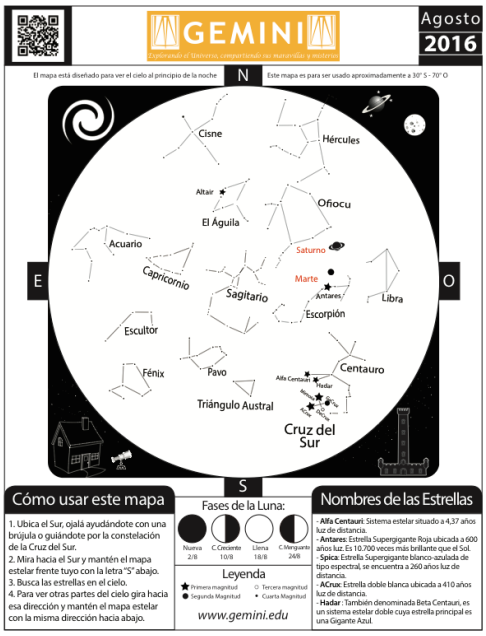


Figure 6-3: Monthly star maps produced by Gemini staff are used by educators who borrow the StarLab as well as local Chilean families and beginning skywatchers. Sky maps are available for download at: http://www.gemini.edu/node/11284

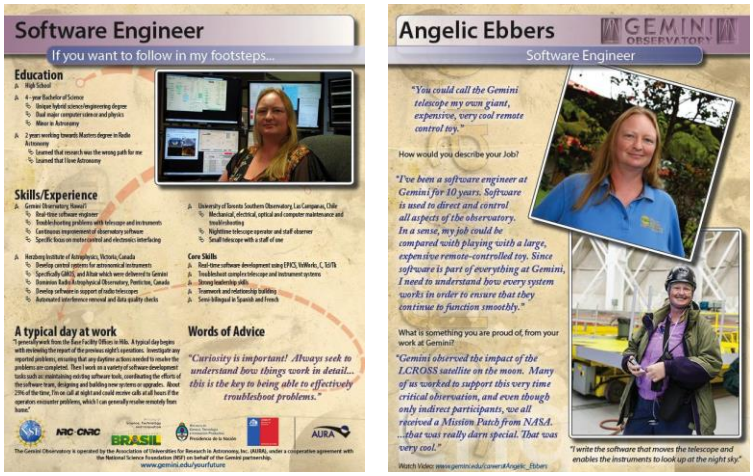


Figure 6-4:Sample of an in-depth STEM career profile sheet (front and back). These augment the Gemini Career Brochure and other resources which promote Observatory careers among students both locally and beyond.

6.3 User and Public Communications

6.3.1 Social Media

During the period of this report Gemini's social media presence has become more analytical with ongoing tracking of the balance of posted content and its impact. With our two primary audiences being our science users and the general public, we now routinely track our emphasis on each audience, as well as the balance of posts between both Gemini telescopes. Figure 6-5 shows the distribution and illustrates our overall success in this *frequency balance*, as well as areas where more effort is needed (e.g. increasing public posts from Gemini South).

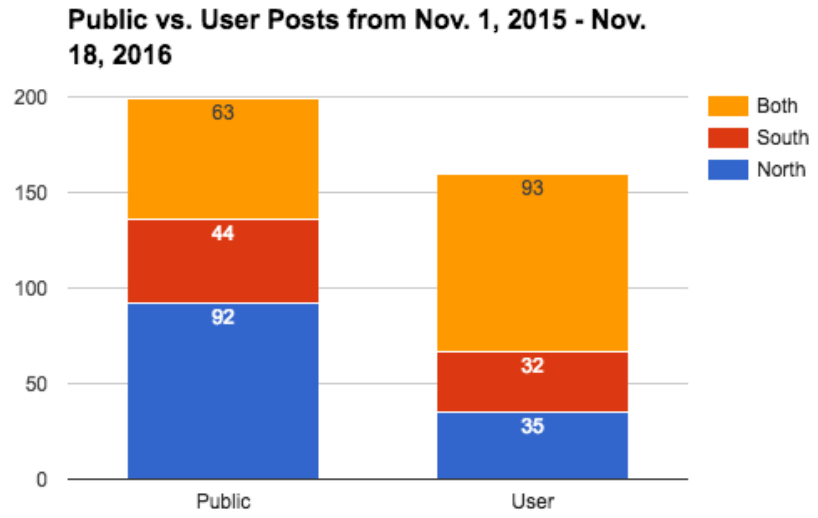


Figure 6-5: Social media posts over past six months showing distribution of posts for the public (left bar) and users (right bar) and how they correspond to either Gemini North, South or both telescopes.

In addition, we continue to track overall impact and engagement levels for our Facebook followers. Engagement continues to grow at a healthy rate (Figure 6-6).

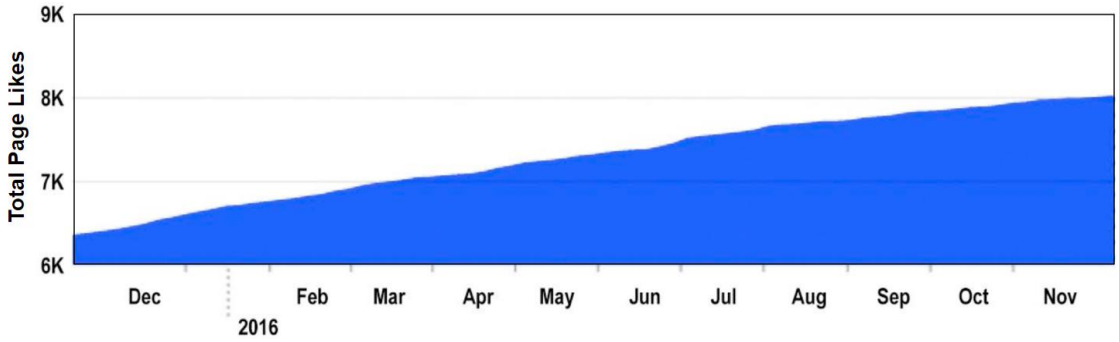


Figure 6-6: Facebook "likes" as an indication of engagement of our followers.

6.3.2 User Communications: Publications and Conferences

Gemini's PIO group provides critical support in communications with our user community by providing diverse publications that range from our quarterly newsletter (Figure 6-7), to a monthly e-newscasts (http://www.gemini.edu/enewscast), e-mail alerts, and printed/online brochures. In addition, we produced a total of 32 "WebFeatures" highlighting recent science results from Gemini (this includes 12 press releases, as described in the next section).

Working closely with Gemini's Science User Support Department (SUSD), we have extended interactions with our internal scientific staff to better promote timely and accurate information for our user community. Each monthly edition of our e-newscast, as well as the *Gemini*Focus newsletter, now contain regular input from the SUSD.

Support of user communication activities extend beyond publications to include scientific conference support, especially the annual American Astronomical Society (AAS) winter

meetings. The development of conference exhibit materials and publications requires significant resources and over the past year also includes long-term coordination with other optical/infrared NSF/AURA centers for the production of an exhibit “pavilion” projecting a unified look and identity at the AAS meetings. Conference materials and publications are multi-purposed for use at our Partner astronomical conferences as well as other technical meetings such as the annual Society of Women Engineers (SWE).

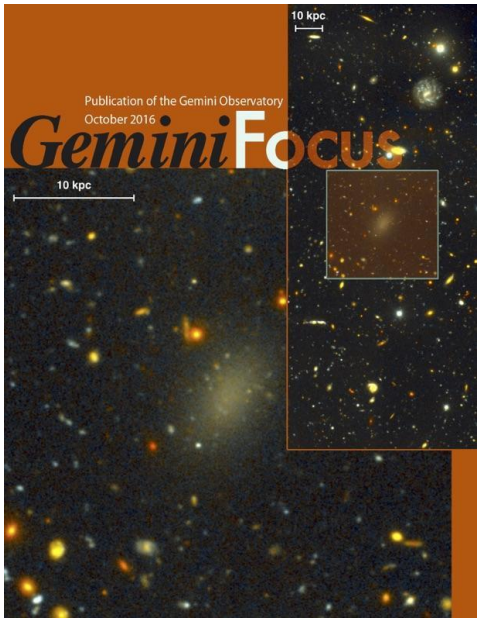


Figure 6-7: Recent issue of the quarterly *Gemini*Focus newsletter, a primary electronic and hard-copy communication product for our user community

6.3.3 Media Relations and Press Releases

We exceeded (150%) our annual goal of eight press releases. The 12 press releases, based on Gemini science, included topics ranging from the coldest known brown dwarf to a galaxy with 99.9% dark matter (shown on the cover of *Gemini*Focus in Figure 6-7). These releases were covered by numerous high-profile publications including blogs and traditional media.

6.4 Additional Opportunities and Milestones

Beyond the accomplishments described in the previous sections, the Gemini PIO efforts, during the period of this report, included other important opportunities and milestones.

Among the opportunities was staff participation in a variety of professional conferences and meetings, including Communicating Astronomy with the Public (CAP), National Science Teachers Association (NSTA), and Society of Women Engineers (SWE) as well as the completion of several staff training opportunities.

Gemini PIO continues to reach milestones set to improve and expand our communication and outreach efforts. In 2016 we restructured our staffing to include a 1.0 FTE PhD astronomer (hired in late 2016). This position provides major user communications, public/media communications, and outreach support from the Gemini South offices. Additionally an entry-level, limited-term position (3 years) was added in

early 2016 to support succession in local outreach and social media content production. Finally, the second year of the PIO internship program is underway at Gemini North.

6.5 PIO Outreach Statistics

Activity/Event	Attendance
Journey Through the Universe, Hawai'i	9,061
Viaje al Universo, Chile	6,062
StarLab (Hawai'i and Chile)	3,998
Family Astro, AstroDay etc.	2,869
Live from Gemini (Hawai'i)	45
Summit Tours (Hawai'i and Chile)	789
Total	**22,824**

Table 6-1: Participation in outreach activities

6.6 Broadening Participation and Workforce Development

Gemini continues to invest in its commitment to Workforce and Diversity. A strategic objective has been drafted for the period 2017-21 – *To be a model organization, inspiring others, in matters of diversity in the STEM workforce.*

Toward this objective, we introduced several new initiatives and actions during 2016:

1. "Diversity and Inclusion" is now a Performance Standard in the annual performance reviews to hold individuals and managers accountable and to promote diversity in the Working Culture.
2. We developed a Workplace Culture and Conduct training program and rolled out part one, focusing on AURA policy and sexual harassment, this year. The second part, focusing on AURA values, diversity and bullying behavior, will roll out in early 2017.
3. Furthermore, AURA continues to monitor developments in the area of unconscious bias (especially during the hiring process) and to educate its management, workforce, and governance. Briefings on the role of unconscious bias to hiring committees and hiring managers are a well-established part of the recruiting process and form the basis for fair treatment of applicant pools.
4. AURA had a booth presence at the October 2016 Society of Women Engineers National Conference held in Philadelphia, a significant presence from Gemini contributed to the ~11,000 attendees that included over 20 female engineers from AURA.

Gemini continued to develop workforce pipeline initiatives during 2016. The programs and internships are highlighted in Table 6-2.

Department/Specialty	Funding	Educational Skill Level	Intern Program	2016 Interns
Engineering / Technical / Science	Akamai	Undergraduate	Akamai	3
Engineering / Technical	Gemini	Undergraduate / Graduate	Univ. of Victoria	2
Science	AGUSS	Undergraduate	AGUSS	5
Science/Engineering	Gemini	Various	Internal	8
Engineering	INSPIRE	Undergraduate	INSPIRE	1
Engineering	AURA/Gemini	Undergraduate / Graduate	Chilean Universities	1

Table 6-2: Gemini internships in 2016

7 Finance and Organization

7.1 Finance

The Finance team works with budget managers and directors to develop and analyze budgets, staffing, and compensation plans. The Finance team process all budget input and monthly expenditures. In 2016 the team used the "scratchpad" budget model to carry detailed justifications of all account budgets in a single repository. Gemini Finance implemented a new interface process to transfer payroll and HR data more efficiently and securely, and developed controls to verify that accounting, payroll, and procurement data are transferred accurately between Gemini and CAS business systems. Additionally, in 2016 the Finance and AURA-CAS teams worked actively with NSF-DACS and NSF-CAAR in the negotiation of the 2017-2022 budget for the Gemini renewal Cooperative Agreement (CA) and Cooperative Support Agreement (CSA).

7.2 Organization and Staffing

Gemini currently has 168 employees on a Full Time Equivalent (FTE) basis; 51% of the staff members are based in Hilo and 49% are based in La Serena. Table 7-1 shows the distribution by Division and Core or Extra staff category. Annual staff turnover is currently about 7%. Core positions are the minimum needed to run the Observatory on a daily basis and to enable development capabilities (projects in operations or infrastructure improvements; as well as AO, instrumentation, telescope development, etc.). Extra positions support tactical plans (temporary need for more skills in an area, anticipation of retirement/succession planning, and others). These are enabled by voluntary turnover rate (typically 5-10%) and hiring lag (typically 3-6 months), and do not increase the total Observatory budget beyond the Board-authorized 3% margin.

FTEs by Division	Core	Extra	Total
Administration	16	1	17
Development	10	8	18
Operations	106	7	113
Deputy Director	12	1	13
Directorate	7		7
Total	151	17	168

Table 7-1: 2016 staffing

7.3 Budget

7.3.1 Partner Contributions

The schedule of contributions for the Gemini Observatory budget is governed by a set of Administrative Guidelines; *i.e.* agreements made among the members of the Gemini International Partnership including NSF. These agreements clarify the members' Partnership shares and the timing for the payment of contributions. Table 7-2 shows the distribution of the Gemini cost shares under the current Partnership.

Partner	Cost Share
United States	66.46%
Canada	18.01%
Australia is l-t after 2015 *	0.24%
Argentina	3.08%
Brazil	6.47%
Korea l-t in 2016, partner after 2018 *	5.74%
Total	100.00%

* l-t: limited term

Table 7-2: Partners' cost shares

Table 7-3 sets forth 2016 actual contributions by Partner for Operations and Maintenance (O&M), Instrument Development Fund (IDF), and the combination of the O&M and IDF funds, including contributions from limited-term participants. Throughout, values are given in US$1000, except where noted.

Contributions	O&M	IDF	Total
US	18,022	1,802	19,824
Canada	5,009	500	5,509
Australia	0	467	467
Argentina	856	86	942
Brazil	1,798	179	1,978
Korea*		1,350	1,350
Total	**25,684**	**4,385**	**30,070**

*Limited-term arrangement in 2016.

Table 7-3: 2016 actual contributions by Partner

We use O&M funds to support the day-to-day activities involved in operating the telescopes and facilities. Broadly speaking, these activities are science support, engineering, instrumentation support, administration (including operations costs for base facilities, fleet and mountain infrastructure), software, information systems, research, public information, safety and the directorate. The IDF is dedicated to renewal and improvement of instrumentation and telescope facilities, primarily executed as contracts to teams within the Partnership and spent over multiple years.

7.3.2 Financial Results for the Year of 2016

Table 7-4 gives the summary of estimated O&M actual expenditures by expense category, Values through the end of 2016Q3 are actuals. Table 7-5 shows the summary of estimated IDF actual expenditures by Instrumentation Development project as of Q3.

in $ US	2016 Estimated Expenses	2016 Budget	Var 2016 Budget vs. Forecast $	Var 2016 Budget vs. Forecast %
Total Labor	17,334,586	17,739,633	(405,047)	-2%
Supplies Equipment	1,291,143	1,089,041	202,102	19%
Travel	909,288	952,791	(43,503)	-5%
Recruiting Relocation	58,000	58,000	-	0%
Professional Fees	1,535,597	1,531,005	4,592	0%
Meeting, Conf., Prof Dev.	271,955	311,833	(39,878)	-13%
Computer SW. and Equip	607,238	539,854	67,384	12%
Total Site Costs	2,418,719	2,496,498	(77,779)	-3%
Spares	264,750	370,810	(106,060)	-29%
Other	34,808	502,036	(467,228)	-93%
Indirect Costs	634,559	986,169	(351,610)	-36%
Subcontracts	1,045,291	614,829	430,462	70%
Total Non-Cap. Exp.	26,405,934	27,192,500	(786,566)	-3%
Capital - General	1,394,066	107,500	1,286,566	1197%
Total Cap. Exp.	1,394,066	107,500	1,286,566	1197%
Total Non-Labor Expenditures	10,465,414	9,560,367	905,047	9%
TOTAL EXPENDITURES	27,800,000	27,300,000	500,000	2%

Table 7-4: O&M 2016 Actual vs Budget Expenditures; actual through Q3-2016

In $k	2016 Budget	2016 Estimated Expenses	2016 Actuals as of 09/30/16	2016 Remaining Balance ($)	2016 Remaining Balance %
Program Support	$80	$17	$16	$1	4%
GEN 4#3	$195	$62	$42	$20	32%
Instrument Upgrades + A&G	$870	$105	$77	$29	27%
GHOST	$3,114	$2,167	$1,701	$466	22%
AO Upgrades	$121	$26	$11	$15	58%
LGSF upgrades	$879	$836	$330	$506	0%
GMOS CCDs	$42	$20	$18	$2	10%
GeMS-DM0	$461	$0	$0	$0	0%
GPI – HIA	$273	$273	$273	$0	0%
Total	**$6,035**	**$3,506**	**$2,468**	**$1,039**	**30%**

Table 7-5: IDF 2016 Actual vs Budget Expenditures; actual through Q3-2016

7.3.3 2016 Budget vs Actual Variance Analysis

Total O&M 2016 estimated expenses and commitments are $500k or 2% *greater* than the 2016 spending authority approved in the Board resolutions, and this total exceeds Partners' O&M contributions by $2,115k. As part of the Transition Program (TP), this cash deficit is balanced from carry-forward that has accumulated during past years.

Figure 7-1 presents the 2016 budget versus actuals variance analysis (labor and non-labor) by variance driver. Overall, the key factors driving O&M spending changes outside the TP in 2016 are: (1) unplanned devaluation of Chilean Peso (CLP) of 8.1% (from CLP 620 to CLP 670 per USD 2016 annual average exchange rate), which leads to a $381k effect in labor); (2) reduction of 2016 labor costs due to unplanned FTEs reduction or unplanned leavers (net decreasing labor costs of $1,205k); (3) increasing labor for hiring

of Extra FTEs of $907k; (4) increasing labor for marginal merit increases of $ 274; increasing non-labor for additional computer equipment of $73k; (5) budget underrun due to reduced electricity and indirect costs of $632k; (6) increasing facilities and travel expenses of $87k; (7) increasing O&M non-labor costs due O&M and TP projects of $900k; and (8) increasing O&M expenses for the GN Toptica Laser of $977k.

With net savings in 2016 and the opportunity to implement additional Transition Program and O&M projects for long-term savings, sustainability, and infrastructure improvement, we included a net 2016 non-labor budget increase of $1,877k. O&M and TP projects of $900k include GN shutter repairs, new solar energy systems at GS summit facilities and base facilities office expansion. The remaining budget addition of $977k O&M expenses are due to the GN Toptica Laser.

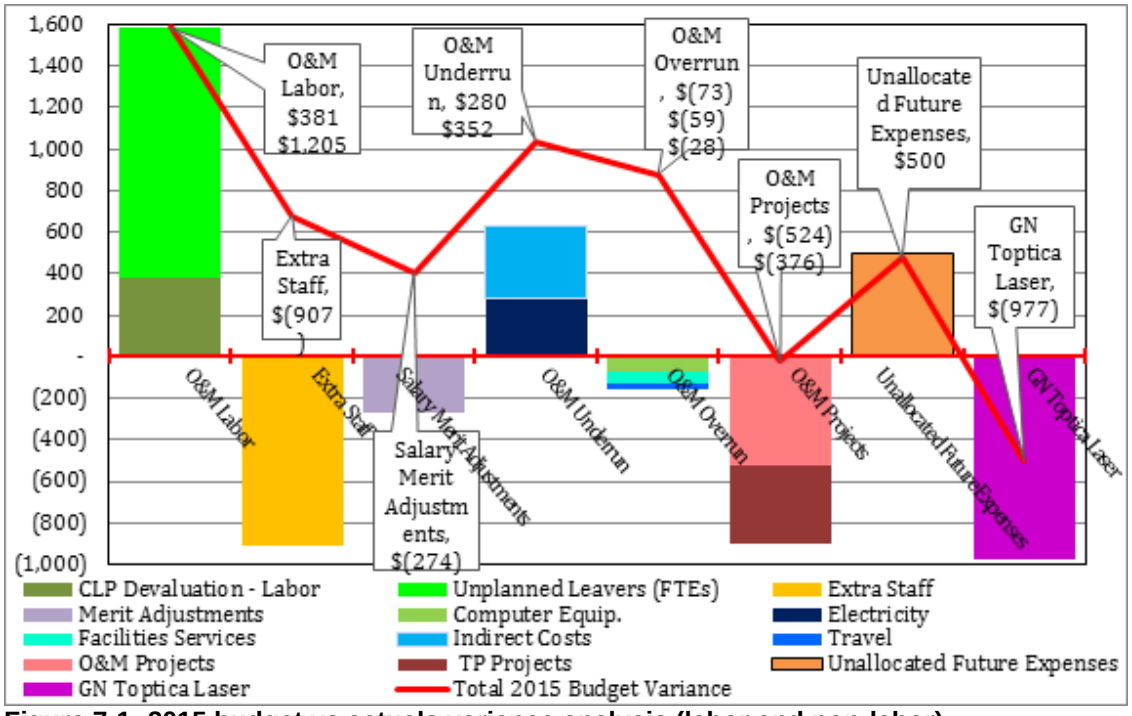


Figure 7-1: 2015 budget vs actuals variance analysis (labor and non-labor)

For IDF the 2016 expenses are $2,468K below the 2016 approved budget. The summary of IDF 2016 budget vs actual expenditures is shown in Table 7-6.

In $k	2016 Budget	2016 Estimated Expenses	2016 Actuals as of 09/30/16	2016 Remaining Balance
Program Support	$80	$17	$16	$1
GEN 4#3	$195	$62	$42	$20
Instrument Upgrades + A&G	$870	$105	$77	$29
GHOST	$3,114	$2,167	$1,701	$466
AO Upgrades	$121	$26	$11	$15
LGSF upgrades	$879	$836	$330	$506
GMOS CCDs	$42	$20	$18	$2
GeMS-DM0	$461	$0	$0	$0
GPI – HIA	$273	$273	$273	$0
Total	**$6,035**	**$3,506**	**$2,468**	**$1,039**

Table 7-6. IDF 2016 budget vs actual expenditures as of Q4-2016

Table 7-7 presents the drivers of 2016 IDF budget over / under spending.

IDF PROJECT	OVER / UNDER SPENDING
GEN 4#3	Gen 4#3 Contract(s) to start in Q1 2017, hence no funds will be spent on contracts in 2016
Instrument Upgrades + A&G	RFP for the 2016 Instrument Upgrade Program released in Q3. IDF Upgrade Contracts to start in Q2-2017. A&G was low priority in 2016
GHOST	Q4 budgeted $640k payment rescheduled from 2016 to 2017 and rebaseline of GHOST “Contingency Reserve” of $384k
AO Upgrades	NGS2 Factory Acceptance Testing in Q4. ALTAIR RTC upgrade design contract (~$66k) remains on hold
LGSF upgrades	New GS Toptica Laser on track
GMOS CCDs	GMOS-S work completed. The GN GMOS upgrade team resolved the GMOS-N anomalies found, GN upgrade rolled over to 2017
GeMS-DM0	Milestone payments to be paid near completion of the project, which may slip into 2017
GPI - HIA	GPI project complete and closed

T**able 7-7 2016 IDF budget over / under spending analysis**

8 Program Plan for 2017

8.1 Overview of 2017

Gemini’s highest priority remains to operate the Observatory to enable our users’ scientific advancement. We continue to develop new capabilities and operate Gemini’s telescopes on a lower budget against the backdrop of regular operations. All milestone dates throughout this section are 2017 unless otherwise noted, and budget figures in this section are in US dollars.

8.1.1 Observatory Budget 2016–2018 Overview

We will continue to manage the Observatory budget in two categories: 1. Operations and Maintenance (O&M – spent on an annual basis); and 2. Instrument Development Fund (IDF - used for long-term, multi-year instrumentation and adaptive optics projects). Table

8-1 presents the 2016 forecast, the approved 2017 budget, and plans for 2018, in the above categories. Note that the IDF budget in a given year is not exactly aligned with the income in these categories given the multi-year nature of the financed projects.

In $ US	2016 Actual[1]	2017 Budget	2018 Budget	2019 Budget
Operations and Maintenance (O&M)	27,800,000	28,509,441	29,585,649	30,457,838
Instrument Development Fund (IDF)	3,506,167	4,671,160	8,133,523	5,435,952
Total	**31,306,167**	**33,180,601**	**37,719,172**	**35,893,790**

[1]Note: 2016 actual through Q3; estimated for Q4

Table 8-1: Budget overview, by fund, 2016–2019

8.1.2 Economic Assumptions through 2018

Table 8-2 sets forth budget assumptions; these economic ratios are based on updated inflation and foreign exchange (FX) rate forecasts from the International Monetary Fund. We include these economic assumptions, including their effect on labor costs, in the planned budgets.

Year	2017	2018	2019
US inflation	2%	2%	2%
Chile inflation	4.60%	4.60%	4.60%
FX rate CLP/USD	640	640	640

Table 8-2 Budget assumptions 2017–2019.

8.1.3 Staffing Plan

Table 8-3 shows the staffing plans for 2016–2018, as FTEs integrated over each calendar year. Most of the planned effort remains within defined Divisions: Operations staff support operations activities and Development staff support instrument development projects. Engineering effort contributes to Development projects at the ~10% level. The staffing plan indicates the number of Core and Extra FTEs for 2016 and 2017-2018. The FTEs' tags "CORE" and "EXTRA" that we introduced in the 2017 staffing plan are defined in section 7.2 above.

	Core Staff			Extra Staff			Total Staff		
	2016 Plan	2017 Plan	2018 Plan	2016 Plan	2017 Plan	2018 Plan	2016 Plan	2017 Plan	2018 Plan
Administration	15.5	16.0	16.0	1.0	1.0	-	16.5	17.0	17.0
Accounting	2.0	2.0	2.0				2.0	2.0	2.0
Facilities & Admin.	12.0	12.0	12.0				12.0	12.0	12.0
Safety	1.5	2.0	2.0	1.0	1.0		2.5	3.0	3.0
Development	10.3	12.0	12.0	7.8	5.1	5.0	18.1	17.1	17.0
Adaptive Optics	4.0	5.0	5.0	3.1	2.8	3.0	7.1	7.8	8.0
Sys. Engineering	3.3	4.0	4.0	1.5	1.3	1.0	4.8	5.3	5.0
Instrumentation	3.0	3.0	3.0	3.2	1.0	1.0	6.2	4.0	4.0
Operations	106.5	110.9	111.1	6.6	7.8	8.0	113.1	118.7	119.1
Engineering - S	8.9	10.0	10.0	1.0	0.4	-	9.9	10.4	10.0
Engineering - N	9.0	9.0	9.0	1.0	1.0	1.0	10.0	10.0	10.0
ISG	12.2	12.0	12.0				12.2	12.0	12.0
SOS - S	10.0	10.0	10.0				10.0	10.0	10.0
SOS - N	10.0	10.0	10.0				10.0	10.0	10.0

Astronomers -S	11.3	12.2	12.1	0.7	1.0	1.0	12.0	13.2	13.1
Astronomers-N	9.4	10.8	11.0	0.7	1.0	1.0	10.1	11.8	12.0
Software	12.9	14.0	14.0	1.3	4.0	5.0	14.2	18.0	19.0
Spotters	-	-	-	1.0	-	-	1.0	-	-
Summit Crew - S	11.8	12.0	12.0	1.0	0.3	-	12.8	12.3	12.0
Summit Crew - N	11.0	11.0	11.0				11.0	11.0	11.0
Deputy Dir	11.8	12.5	12.5	1.1	1.8	2.0	12.9	14.3	14.5
PIO	5.3	6.5	6.5	0.8	1.0	1.0	6.1	7.5	7.5
SCI User Support	5.9	6.0	6.0	0.3	0.8	1.0	6.2	6.8	7.0
Directorate	7.0	7.0	7.0				7.0	7.0	7.0
GRANDTOTAL	**151.1**	**158.4**	**158.6**	**16.5**	**15.6**	**15.0**	**167.6**	**174.0**	**173.6**

Table 8-3: 2017 Staffing Plan – Core and Extra FTEs

8.1.4 Operations & Maintenance (O&M) Budget 2016 to 2018

The Operations and Maintenance (O&M) budget supports the day-to-day activities involved in operating the telescopes and facilities. Table 8-4 shows the O&M budget by cost categories for the period 2017 - 2018.

8.1.5 Instrument Development Fund (IDF) Budget 2014-2017

The IDF is used for instrumentation and adaptive optics systems. Table 8-5 presents the IDF 2017-2018 spending plan by instrument project, defined in §5 above. The additional account line for program support contains the budget for contracted work to support future instrument upgrades.

In $ US	2015 Actual	2016 Forecast	2017 Budget	2018 Budget
Salaries	12,652,582	12,530,002	13,148,873	13,301,512
Benefits	4,450,309	4,348,235	4,428,775	4,562,708
Temporary	370,214	593,386	608,468	-
EXTRA Staff			458,213	630,954
Finiquitos accrued liability Amortization			366,667	366,667
Accrued Finiquitos			146,000	146,000
Total Labor	17,473,105	17,471,624	19,156,996	19,007,841
Supplies Equipment	1,165,824	1,183,345	1,235,064	1,155,364
Travel	975,550	967,582	952,032	1,010,817
Recruiting Relocation	238,716	58,000	69,000	60,010
Professional Fees	1,560,846	1,546,005	1,639,367	1,493,408
Meeting, Conferences, Prof Dev.	328,970	309,053	347,528	330,823
Computer Software and Equipment	523,898	602,708	664,096	572,731
Facilities	653,946	638,836	615,775	688,666
Maintenance	150,673	182,069	174,408	193,157
Utilities	1,262,051	1,298,802	1,064,652	1,377,687
Meals and Lodging	525,545	391,694	277,148	389,025
Total Site Costs	2,592,215	2,511,400	2,131,983	2,648,535
Spares	412,714	247,539	138,300	393,392
Other	70,165	280,628	71,470	556,106
Indirect Costs	722,587	836,169	672,766	828,025
Subcontracts	1,514,747	1,063,151	543,660	652,272
Total Non-Capital Expenditures	27,579,337	27,077,204	27,622,262	28,709,323
Capital Computer	475,371	-	115,600	379,946

Capital General	438,878	222,796	771,579	496,380
Total Capital Expenditures	914,250	222,796	887,179	876,326
TOTAL EXPENDITURES	28,493,586	27,300,000	28,509,441	**29,585,649**

Table 8-4: O&M budget by cost categories for the period 2017–2018, values in USD

In $ US	Budget 2017	Budget 2018	Budget 2019
Instr. Program. Support and Maintenance	69,610	71,490	73,420
GHOST	810,000	2,211,000	549,000
GHOST - Internal	80,000	82,160	84,378
Instrument Upgrades	250,500	666,917	324,401
AO upgrades (Altair, Canopus)	246,000	131,432	0
A&G System Development	752,000	648,932	120,375
LGSF upgrades	895,750	0	0
GMOS CCD Replacement	22,900	0	0
Gen4#3	1,000,000	4,200,000	4,200,000
Gen4#3 - Internal	80,000	82,160	84,378
GEN5#1	0	0	0
GEN5#1 Internal	0	0	0
GeMS-DM0	390,900	39,432	0
GPI Relocation Study	73,500	0	0
GPI - HIA, Opto-Mech Super Structure	0	0	0
TOTAL IDF	**4,671,160**	**8,133,523**	**5,435,952**

Table 8-5: IDF spending for the years 2016 – 2018 by instrumentation project

8.2 Science and Engineering Operations in 2017

8.2.1 Regular Operations

Regular day-to-day and night-to-night Operations is the Observatory's top priority. It includes the following items.

- Maintain the instruments and telescopes in working order consistent with the requested science time on sky; monitor performance and take remedial action as needed.
- Run the International Time Allocation Committee (ITAC) process to combine the national TAC results into an executable queue and visitor program consistent with available time, conditions, and instrumentation.
- Support the user community (in conjunction with the NGOs) in preparing their observations for the telescope.
- Provide web-based documentation suitable for PI reference on instrumentation, software and Observatory processes.
- Execute queue observing programs on behalf of the community as required; currently this equates to more than 80% of the observing.
- Support visiting observers in their execution of their own and others' programs on the telescopes.
- Ensure integrity of data (headers & quality control information) entering the Gemini Observatory Archive.
- Support visiting instruments as needed and as possible.
- Propose and execute continual improvements in instrumentation, telescope, and enclosure to maintain performance levels.
- Propose and execute continual improvements in operations software on behalf of the community and for internal usability, to maintain performance levels.

- Propose and execute continual improvements in operations processes on behalf of the user community, with guidance and input from the appropriate committees.
- Provide expertise and input to the Development Division in carrying out major enhancements of instrumentation.
- To ensure economical operations and a consistent interface with the user community, maintain approximate symmetry between the processes, equipment, and staffing at the two Gemini sites.
- Staff the "third" and final level of a helpdesk to respond to queries from the user community. (The first two levels are (i) NGOs and (ii) instrument specialists at the NGOs.)

A regular system of preventive and corrective maintenance supports the first requirement of maintaining the instruments, telescopes, and enclosures in working order. Preventive maintenance is carried out at the summits on a regular schedule (daily, weekly, etc. depending on the system) using a system of work orders. More major items requiring additional staffing are handled by planning on a variety of timescales. A central list of major maintenance work is held by the Heads of Engineering Operations and is discussed weekly among engineering managers and at the quarterly planning meetings. Items are tracked according to progress or completion, and new needs are evaluated before adding to the list and determining a possible schedule.

8.2.2 Science and Engineering Operations Core Projects and Goals

In addition to this regular operations support, in 2017 we will undertake a number of projects to improve longer-term sustainability impact or to improve service to users.

- Implement first round of work on Observatory-wide Obsolescence Mitigation Plan
    - The obsolescence plan spans five years. Work will continue throughout 2017.
- Real-time Software Upgrades
    - All of the agreed elements of this project should be complete by Q4. Possible threats to schedule include GMOS-N CCDs (if significant issues surface during commissioning) and NGS2 (for which the scope of the software effort is not yet known).
- Replace the Gemini North dome shutter drive chains and gearboxes
    - To be complete by Q3. The Gemini Board has granted engineering shutdown time to carry out this replacement, spanning the end of Semester 2017A and beginning of Semester 2017B.
- Science Operations Model Upgrade
    - Work has commenced on a subset of high-priority options emerging from the Science Operations Review. Some will be complete within 2016; others will extend into 2017, including the provision of an archived method of communication on all accepted science programs (Q3) and advance work on a more automated queue planning system to streamline the Queue Coordinating process (planning and prototyping may extend throughout 2017, as software effort to implement it will not be available initially).
- Upgrade the Cerro Pachón Network Link
    - We expect to be using the LSST's fiber optic connection early in 2017. At present the timeline calls for the fiber to be in place by the end of 2016 so we hope to be using it by the end of Q1 2017. We are not in control of the schedule on this work.

8.3 Science User Support in 2017

The Science User Support Department (SUSD) advocates for the users and enables Gemini Principal Investigators to produce world-class scientific results in a timely manner. The SUSD leads post-observing user support. Its staff maintain a data reduction package for the user community that enables astronomers to remove instrumental signatures from data obtained using Gemini facility instruments, and they support users in its use. The SUSD maintains communications between the Observatory and the National Gemini Offices and ensures that NGO staff members receive appropriate training. Specific goals for 2017 follow.

- Complete implementation of a coherent system of user communication throughout the "science lifecycle", including regular support for the Data Reduction User Forum (DR Forum), post-observing contact with PIs, and improvements to the regular support mechanism that the Helpdesk currently provides.
    - Evaluate DR Forum traffic in the context of the "user contributor" role (Q1)
    - Begin collecting and tracking user satisfaction data and feedback (Q1)
    - Implement new external Helpdesk (Q2)
    - Implement post-observing contact with PIs and revise Contact Scientist duties and responsibilities (Q4)
- Improve data reduction software documentation and cookbooks.
    - GNIRS cookbook (Q2)
    - FLAMINGOS-2 cookbook (Q2)
- Release Python science quality data reduction software for facility imaging modes (GMOS, F2, NIRI, and GSAOI) for users (Q3).
- Update Gemini IRAF for new GMOS-N Hamamatsu CCDs (Q2) and F2 MOS mode (Q1). These will be the last releases of Gemini IRAF.

8.4 Instrumentation and Facility Development in 2017

The 2017 plans for instrumentation and facility development build on several substantial on-going projects. We list principal objectives for the year in Table 8-6. Table 8-7 outlines our goals for lower priority projects we will execute on a best-efforts basis. We expect to make substantial progress on many of these projects while understanding that we may postpone or alter any and/or all of them to accommodate increased needs for any of the higher priority projects.

Project	2017 Plan
GHOST	Complete Build Phase and Start Test Phase (Q4)
Gen4#3	Start Conceptual Design Stage (aggressively, Q2)
Toptica Lasers	Commission GeMS laser (Q3); Receive Altair laser (Q4)
GMOS CCDs	Install and commission new CCDs into GMOS-N (Q1)
Instrument Upgrades	Complete 2015 project (Q2); Start 2016 project(s) (Q2); Issue 2017 RfP (Q4)
NGS2	Tentatively receive, test, and install (TBD)

Table 8-6: High-priority projects for Development and their planned activities in 2017

Project	2017 Goals
A&G	Demonstrate new mechanism controller functionality with all required mechanisms
	Test and characterize new wavefront detector system for higher sensitivity
Altair	Start contracted work to replace the real-time computer to allow for higher performing algorithm implementation
	Commission the new Altair dichroics
DM0	Receive DM0 and electronics to serve as spare for existing DMs.
IR Detector Controller	Demonstrate ARC controller with Multiplexer
	Develop requirements for software needed to support new controller

Table 8-7: Goals for non-priority Development projects in 2017

8.5 Administration & Facilities and Safety in 2017

8.5.1 Finance and Administration

Administration provides cost-effective administrative support and delivers timely and accurate information to management and governance. The Administration and Facilities Group (AFG) supports in the areas of facilities, infrastructure, fleet, administration, visitor services, and travel services to staff and visitors. The Finance team delivers financial guidance and information to management to support executing budgets within the Board authorized limits. Specific goals for 2017 follow, to be completed by the end of the year.

- Budgetary responsibility
  - Finish 2017 within [-2%; +3%] of the requested O&M Budget ($28.0M). Continue to promote the accountability among the budget account managers.
- Business Services
  - Assist Gemini employees in receiving training and developing any knowledge required to operate uniformed business systems that will serve Gemini and other NSF-funded programs.
- Business Systems Review (BSR)
  - Gather and prepare the documentation required for the anticipated 2017 BSR, respond to NSF inquiries on the 2017 BSR and if needed, implement changes or actions in response to the results of the BSR process that NSF will complete in 2017.
- Facilities Services
  - Continue modernizing HBF & SBF facilities. Review and adjust AFG's operations standards to achieve 2017 cost efficiency and energy sustainability goals. Provide superior workplaces for Gemini's employees in 2017.

8.5.2 Safety

The Safety program assures a safe and healthy environment for employees and visitors. Gemini's working culture explicitly emphasizes safety of people and equipment. The Safety group will fully integrate safety into the Observatory operational activities, and will work jointly with partner telescopes on Cerro Pachón and Maunakea to establish shared Safety programs that combine best practices and resources. Specific goals to complete by the end of 2017 follow.

- Staff Safety
    - Continue providing and assuring a safe and healthy environment for employees and visitors. Provide modern Safety tools and systems and achieve a 90% completion of the mandatory Level A and 80% of the mandatory Level B safety training.
- Safety Operations
    - Produce a consolidated Gemini Safety group that delivers Safety services consistent with those of co-located NSF-funded centers in Chile. Continue establishing synergies and sharing Safety resources with other Maunakea telescopes.
- Managers' Safety responsibilities
    - Assist Gemini Managers to perform the Managers' Safety tasks required in OSHA's standards and Gemini's Safety program. Suggest actions that help to mitigate Safety hazards identified in the regular Safety walkthroughs.

8.6 Public Information and Outreach in 2017

We will continue our regular local outreach programming, including: Journey Through the Universe (JTTU), Viaje al Universo (Viaje), AstroDay, StarLab, media relations, publications, electronic and social media, user communications support, PIO internship, library services, and science result tracking. We also identify the following specific expanded activities to complete in 2017.

- Integrate, as a pilot program at Gemini North, the utilization of an outside contracted evaluation firm to assess student and teacher understanding of Observatory STEM career opportunities. (Q3)
- Expand Observatory STEM career resources outreach programming to include a minimum of 3 new events/activities at each site over the full year, to increase awareness and understanding of Observatory career opportunities available in host communities (Hilo and La Serena). (Q4)
- Extend JTTU/Viaje beyond concentrated "Journey Week" into multiple (minimum of 6) year-long activities, interactions, and programming in local host communities. (Q4)
- Expand capacity of new Gemini-South PIO hire to user communications support and media relations.
    - Implement formal training and work-plan for new position (Q1)
    - Independent completion of at least 2 press releases and 2 web features (Q3).
    - Expand (and update) international media contact list to 50 relevant journalists (Q4).
- Integrate new press release template within Gemini website (Q1)
- Complete audience segregation of social media content into separate (distinct) accounts (Q2)

8.7 Gemini External Relations in 2017

- Directorate attendance at Partner national astronomy meetings
- Develop Strategic Plan to implement Gemini Board's Strategic Vision
- Lead the development of memoranda of understanding with any new limited-term Partners

8.8 HR Plans in 2017

The following goals focus on increasing staff satisfaction and engagement, as measured by achieving a staff voluntary turnover rate below 6%.

- Implement changes to researcher roles, including changing time allocations for research, specialized roles for Fellow vs. Scientist vs. Astronomer, collaborative activity of Instrument Scientists, and support of Science User Support Department activities
- Issue completed Manager's Handbook
- Identify and implement actions following the Staff Engagement Survey

Appendix A. Acronyms and Abbreviations

A&G	Acquisition and Guiding units
AAO	Australian Astronomical Observatory
AFG	Administration and Facilities Group
Altair	Altitude Conjugated Adaptive Optics for Infrared
ANU	Australian National University
AO	Adaptive Optics
ApJ	Astrophysical Journal
ARC	Astronomical Research Cameras
AURA	Association of Universities for Research in Astronomy, Inc.
BFO	Base Facility Operations
CADC	Canadian Archive and Data Centre
CAS	(AURA) Central Administrative Services
CCD	Charge-Coupled Device
CP	Cerro Pachón
DR	Data Reduction
DSSI	Differential Speckle Survey Instrument
ESPaDOnS	Echelle Spectro-Polarimetric Device for the Observation of Stars
FDF	Facilities Development Fund
FITS	Flexible Image Transport System
FTE	Full-Time Equivalent
FTZ	Foreign Trade Zone
GeMS	Gemini Multi-conjugate Adaptive Optics System
Gen4#3	Gemini's next facility class instrument (Generation 4, #3)
GHOST	Gemini High-resolution Optical SpecTrograph
GIFS	Gemini Instrument Feasibility Studies (for Gen4#3)
GMOS	Gemini Multi-Object Spectrograph
GMOS-N	Gemini Multi-Object Spectrograph-North
GMOS-S	Gemini Multi-Object Spectrograph-South
GN	Gemini North
GNIRS	Gemini Near-Infrared Spectrograph
GOA	Gemini Observatory Archive
GPI	Gemini Planet Imager
GRACES	Gemini Remote Access to Canada-France-Hawaii ESPaDOnS Spectrograph
GS	Gemini South (or Gemini Staff, only in time allocation listing)
GSA	Gemini Science Archive
GSAOI	Gemini South Adaptive Optics Imager
HBF	Hilo Base Facility
ICD	Interface Control Document

IDF	Instrument Development Fund
IFU	Integral Field Unit
IMF	International Monetary Fund
IR	Infrared
ITAC	International Time Allocation Committee
IYoL	International Year of Light
KASI	Korea Astronomy and Space Science Institute
LCH	Laser Clearing House
LGSF	Laser Guide Star Facility
LLP	Large and Long Program
MCAO	Multi-Conjugate Adaptive Optics
MK	Mauna Kea
MNRAS	Monthly Notices of the Royal Astronomical Society
NGO	National Gemini Office
NGS2	Natural Guide Star Wavefront Sensor upgrade project (for Gemini South)
NIFS	Near-Infrared Integral Field Spectrometer
NIR	Near-infrared
NIRI	Near Infrared Imager and Spectrometer
NOAO-S	National Optical Astronomy Observatory-South
NRC-H	National Research Council of Canada, Hertzberg Institute for Astronomy
NSF	National Science Foundation
NTAC	National Time Allocation Committee
O&M	Operations and Maintenance (budget fund)
OCS	Observatory Control Systems
OIWFS	On-Instrument Wavefront Sensor
PI	Principal Investigator
PIO	Public Information and Outreach
PNAS	Publications of the National Academy of Sciences
Q1	Quarter 1
QAP	Quality Assessment Pipeline
SOS	Science Operations Specialist
SPEC	Special grants and awards fund
STAC	Science and Technology Advisory Committee
STEM	Science, Technology, Engineering, and Mathematics
SUSD	Science User Support Department
TAC	Time Allocation Committee
TP	Transition Program
UCG	Users' Committee for Gemini
US	United States
z	Redshift

Appendix B. Publications by Staff

B.1 Staff Refereed Publications

Levenson, N. A.[8]. The nuclear and extended mid-infrared emission of Seyfert galaxies. *Monthly Notices of the Royal Astronomical Society*, 463:3531-3555. 12/2016.

Levenson, N. A.[10]. The complex evolutionary paths of local infrared bright galaxies: a high-angular resolution mid-infrared view. *Monthly Notices of the Royal Astronomical Society*, 463:2405-2424. 12/2016.

Schirmer, Mischa[1], Levenson, Nancy A.[3], Turner, James[10]. About AGN ionization echoes, thermal echoes and ionization deficits in low-redshift Lyα blobs. *Monthly Notices of the Royal Astronomical Society*, 463:1554-1586. 12/2016.

Miller, Bryan W.[12]. Faint dwarf galaxies in Hickson Compact Group 90*. *Monthly Notices of the Royal Astronomical Society*, 463:1284-1290. 12/2016.

Angeloni, Rodolfo.[2]. A Profile Analysis of Raman-scattered O VI Bands at 6825 Å and 7082 Å in Sanduleak's Star. *The Astrophysical Journal,* 833:286. 12/2016.

Margheim, Steve[5]. Observational Confirmation of a Link Between Common Envelope Binary Interaction and Planetary Nebula Shaping. *The Astrophysical Journal,* 832:125. 12/2016.

Trujillo, Chadwick.[2]. New Extreme Trans-Neptunian Objects: Toward a Super-Earth in the Outer Solar System. *The Astronomical Journal,* 152:221. 12/2016.

Schwamb, Megan[29]. OSSOS. IV. Discovery of a Dwarf Planet Candidate in the 9:2 Resonance with Neptune. *The Astronomical Journal,* 152:212. 12/2016.

Rantakyro, Fredrik[38]. Dynamical Mass Measurement of the Young Spectroscopic Binary V343 Normae AaAb Resolved With the Gemini Planet Imager. *The Astronomical Journal,* 152:175, 12/2016.

Schirmer, Mischa. NEBULAR: A Simple Synthesis Code for the Hydrogen and Helium Nebular Spectrum. *Publications of the Astronomical Society of Pacific,* 128:114001. 11/2016.

Levenson, N. A.[6]. Investigating the dusty torus of Seyfert galaxies using SOFIA/FORCAST photometry. *Monthly Notices of the Royal Astronomical Society*, 462:2618-2630. 11/2016.

Salinas, R.[1]. The Overlooked Role of Stellar Variability in the Extended Main Sequence of LMC Intermediate-age Clusters. *The Astrophysical Journal Letters,* 832:L14. 11/2016.

Geballe, T. R.[6]. Neutron-capture Element Abundances in Magellanic Cloud Planetary Nebulae. *The Astrophysical Journal Letters,* 831:L3. 11/2016.

Roth, K. C.[18]. PS1-14bj: A Hydrogen-poor Superluminous Supernova With a Long Rise and Slow Decay. *The Astrophysical Journal,* 831:144. 11/2016.

Díaz, R. J.[2]. Kinematics of M51-type Interacting Galaxies. *The Astronomical Journal,* 152:150. 11/2016.

Rantakyrö, Fredrik T.[47]. Imaging an 80 au Radius Dust Ring around the F5V Star HD 157587. *The Astronomical Journal,* 152:128. 11/2016.

Angeloni, Rodolfo[6]. A machine learned classifier for RR Lyrae in the VVV survey. *Astronomy & Astrophysics,* 595:A82. 11/2016.

Chiboucas, Kristin[4]. Spectroscopic Confirmation of the Dwarf Spheroidal Galaxy d0994+71 as a Member of the M81 Group of Galaxies. *The Astrophysical Journal Letters,* 830:L21. 10/2016.

Conn, Blair C.[8]. SMASH 1: A Very Faint Globular Cluster Disrupting in the Outer Reaches of the LMC?. *The Astrophysical Journal Letters,* 830:L10. 10/2016.

Leggett, S. K.[1]. Observed Variability at 1 and 4 μm in the Y0 Brown Dwarf WISEP J173835.52+273258.9. *The Astrophysical Journal,* 830:141. 10/2016.

Stephens, Andrew W.[11]. Kinematic Downsizing at z ∼ 2. *The Astrophysical Journal,* 830:14. 10/2016.

Schiavon, Ricardo P.[3]. Infrared High-resolution Integrated Light Spectral Analyses of M31 Globular Clusters from APOGEE. *The Astrophysical Journal,* 829:116. 10/2016.

Cardwell, Andrew[14]. The Orbit and Transit Prospects for β Pictoris b Constrained with One Milliarcsecond Astrometry. *The Astronomical Journal,* 152:97. 10/2016.

Rantakyrö, Fredrik T.[21]. Bringing “The Moth” to Light: A Planet-sculpting Scenario for the HD 61005 Debris Disk. *The Astronomical Journal,* 152:85. 10/2016.

Scharwächter, J.[2]. Large-scale outflows in luminous QSOs revisited. The impact of beam smearing on AGN feedback efficiencies. *Astronomy & Astrophysics,* 594:A44. 10/2016.

Margheim, S.[29]. 450 d of Type II SN 2013ej in optical and near-infrared. *Monthly Notices of the Royal Astronomical Society*, 461:2003-2018. 9/2016.

Hibon, Pascale[1]; Garrel, Vincent[2]; Neichel, Benoit[3]; Carrasco, Eleazar R.[7]; Gimeno, German[8]. First performance of the GeMS + GMOS system - 1. Imaging. *Monthly Notices of the Royal Astronomical Society*, 461:507-518. 9/2016.

Goodsell, Stephen[25]; Rantakyrö, Fredrik T.[47]. Discovery of a Substellar Companion to the Nearby Debris Disk Host HR 2562. *The Astrophysical Journal Letters,* 829:L4. 9/2016.

Chené, A.-N.[13]. Young Stellar Clusters Containing Massive Young Stellar Objects in the VVV Survey. *The Astronomical Journal,* 152:74. 9/2016.

Salinas, R.[1]. An AO-assisted Variability Study of Four Globular Clusters. *The Astronomical Journal,* 152:55. 9/2016.

Scharwächter, J.[14]. The Close AGN Reference Survey (CARS). What is causing Mrk 1018's return to the shadows after 30 years?. *Astronomy & Astrophysics,* 593:L9. 9/2016.

Scharwächter, J.[11]. The Close AGN Reference Survey (CARS). Mrk 1018 returns to the shadows after 30 years as a Seyfert 1. *Astronomy & Astrophysics,* 593:L8. 9/2016.

Carrasco, E. R.[4]. Dynamical analysis of the cluster pair: A3407 + A3408. *Monthly Notices of the Royal Astronomical Society*, 460:2193-2206. 8/2016.

Hibon, P.[24]. First Results from the Faint Infrared Grism Survey (FIGS): First Simultaneous Detection of Lyα Emission and Lyman Break from a Galaxy at z = 7.51. *The Astrophysical Journal Letters,* 827:L14. 8/2016.

Geballe, Thomas R.[4]. The First Spectrum of the Coldest Brown Dwarf. *The Astrophysical Journal Letters,* 826:L17. 8/2016.

Trujillo, Chadwick[2]. Beyond the Kuiper Belt Edge: New High Perihelion Trans-Neptunian Objects with Moderate Semimajor Axes and Eccentricities. *The Astrophysical Journal Letters,* 825:L13. 7/2016.

Conn, Blair[2]. Mapping the Monoceros Ring in 3D with Pan-STARRS1. *The Astrophysical Journal,* 825:140. 7/2016.

Andersen, M.[5]. Deep GeMS/GSAOI near-infrared observations of N159W in the Large Magellanic Cloud. *Astronomy & Astrophysics,* 592:A77. 7/2016.

Simpson, Chris[6]. The identification of post-starburst galaxies at z ˜ 1 using multiwavelength photometry: a spectroscopic verification. *Monthly Notices of the Royal Astronomical Society: Letters,* 459:L114-L118. June, 2016.

Chené, André-Nicolas[4]. GRACES observations of young [α/Fe]-rich stars. *Monthly Notices of the Royal Astronomical Society*, 459:487-495. 6/2016.

Galvez, Ramon L.[19]; Goodsell, Stephen[21]; Hartung, Markus[22]; Rantakyrö, Fredrik T.[34]. Spectroscopic Characterization of HD 95086 b with the Gemini Planet Imager. *The Astrophysical Journal,* 824:121. 6/2016.

Leggett, S. K.[1]. Near-infrared Spectroscopy of the Y0 WISEP J173835.52+273258.9 and the Y1 WISE J035000.32-565830.2: The Importance of Non-equilibrium Chemistry. *The Astrophysical Journal,* 824:2. 6/2016.

Carrasco, Eleazar R.[7]. Low X-Ray Luminosity Galaxy Clusters: Main Goals, Sample Selection, Photometric and Spectroscopic Observations. *The Astronomical Journal,* 151:151. 6/2016.

Smith, Adam B.[1]. Implementation and Operation of a Robotic Telescope on Skynet. *Publications of the Astronomical Society of Pacific,* 128:055002. 5/2016.

Chené, A.-N.[3]. Properties of massive stars in four clusters of the VVV survey. *New Astronomy,* 45:84-91. 5/2016.

McDermid, Richard M.[20]. The ATLAS3D Project - XXXI. Nuclear radio emission in nearby early-type galaxies. *Monthly Notices of the Royal Astronomical Society*, 458:2221-2268. 5/2016.

Rantakyrö, Fredrik T.[33]. Constraints on the Architecture of the HD 95086 Planetary System with the Gemini Planet Imager. *The Astrophysical Journal Letters,* 822:L29-. 5/2016.

Geballe, T. R.[2]. Highly Excited H2 in Herbig-Haro 7: Formation Pumping in Shocked Molecular Gas?. *The Astrophysical Journal,* 822:82-. 5/2016.

Conn, Blair C.[14]. Variable Stars in the Field of the Hydra II Ultra-faint Dwarf Galaxy. *The Astronomical Journal,* 151:118-. 5/2016.

Cardwell, A.[21]; Goodsell, S.[22]; Hibon, P.[24]; Rantakyrö, F.[30]. An M-dwarf star in the transition disk of Herbig HD 142527. Physical parameters and orbital elements. *Astronomy & Astrophysics,* 590:A90. 5/2016.

Chené, A.-N.[2]. Diagnostics of the unstable envelopes of Wolf-Rayet stars. *Astronomy & Astrophysics,* 590:A12. 5/2016.

Carrasco, Eleazar R.[2]. Discovery of the Candidate Off-nuclear Ultrasoft Hyper-luminous X-Ray Source 3XMM J141711.1+522541. *The Astrophysical Journal,* 821:25. 4/2016.

Rantakyrö, Fredrik T.[14]. Point Source Polarimetry with the Gemini Planet Imager: Sensitivity Characterization with T5.5 Dwarf Companion HD 19467 B. *The Astrophysical Journal,* 820:111. 4/2016.

Conn, Blair C.[10]. Distant activity of 67P/Churyumov-Gerasimenko in 2014: Ground-based results during the Rosetta pre-landing phase. *Astronomy & Astrophysics,* 588:A80. 4/2016.

Chené, A. N.[8]. The embedded clusters DBS 77, 78, 102, and 160-161, and their link with the interstellar medium. *Astronomy & Astrophysics,* 588:A63. 4/2016.

Chené, A.-N.[3]. Massive open star clusters using the VVV survey. V. Young clusters with an OB stellar population. *Astronomy & Astrophysics,* 588:A40. 4/2016.

Hibon, P.[9]. The Spitzer-IRAC/MIPS Extragalactic Survey (SIMES) in the South Ecliptic Pole Field. *The Astrophysical Journal Supplement Series,* 223:1. 3/2016.

Conn, Blair C.[1]. MUSE-ings on AM1354-250: Collisions, Shocks, and Rings. *The Astrophysical Journal,* 819:165. 3/2016.

Petric, Andreea O.[10]. The [NII] 205 μm Emission in Local Luminous Infrared Galaxies. *The Astrophysical Journal,* 819:69. 3/2016.

Madrid, Juan P.[1]. The Abell 85 BCG: A Nucleated, Coreless Galaxy. *The Astrophysical Journal,* 819:50. 3/2016.

Carrasco, Eleazar R.[3]. GeMs/GSAOI observations of La Serena 94: an old and far open cluster inside the solar circle. *Monthly Notices of the Royal Astronomical Society*, 456:2126-2139. 2/2016.

Petric, Andreea[3]. Star formation in quasar hosts and the origin of radio emission in radio-quiet quasars. *Monthly Notices of the Royal Astronomical Society*, 455:4191-4211. 2/2016.

Kleinman, S. J.[7]. New white dwarf and subdwarf stars in the Sloan Digital Sky Survey Data Release 12. *Monthly Notices of the Royal Astronomical Society*, 455:3413-3423. 2/2016.

Cardwell, Andrew[6]; Goodsell, Stephen J.[12]; Hartung, Markus[16]; Hibon, Pascale[17]; Rantakyrö, Fredrik T.[25]. The PDS 66 Circumstellar Disk as Seen in Polarized Light with the Gemini Planet Imager. *The Astrophysical Journal Letters,* 818:L15. 2/2016.

Levenson, N. A.[7]; Mason, R. E.[8]. A mid-infrared spectroscopic atlas of local active galactic nuclei on sub-arcsecond resolution using GTC/CanariCam. *Monthly Notices of the Royal Astronomical Society*, 455:563-583. 1/2016.

B.2 Staff Non-Refereed Publications

Geballe, Thomas R.[2]. Cool Temperatures near the Homopause of the 8-μm North Polar Hot Spot of Jupiter. *American Astronomical Society*, *DPS meeting* #48, id.#422.02-300. 10/2016.

Schwamb, Megan Elizabeth [2]. Comet Hunters: A Citizen Science Project to Search for Comets in the Main Asteroid Belt. *American Astronomical Society*, *DPS meeting* #48, id.#406.03. 10/2016.

Schwamb, Megan Elizabeth [1]. Planet Four: Terrains - Pointing the Highest Resolution Camera Ever Sent to Mars with the Help of 10,000 Earthlings. *American Astronomical Society*, *DPS meeting* #48, id.#406.01. 10/2016.

Schwamb, Megan Elizabeth [9]. A new high-perihelion a ~ 700 AU object in the distant Solar System. *American Astronomical Society, DPS meeting* #48, id.#113.08. 10/2016.

Schwamb, Megan Elizabeth [1]. Surface Color Frequencies and Ratios Within the Kuiper Belt. *American Astronomical Society*, *DPS meeting* #48, id.#113.01. 10/2016.

Schwamb, Megan Elizabeth [4]. Lightcurve Studies of Trans-Neptunian Objects from the Outer Solar System Origins Survey using the Hyper Suprime-Camera. *American Astronomical Society*, *DPS meeting* #48, id.#106.06. 10/2016.

Ball, Jesse G.[1]; Trujillo, Chadwick [3]; White, John [4]. Correction of NIRI/ Altair non-common path aberrations using focal plane sharpening. *Proceedings of the SPIE,* 9909:990968. 7/2016.

Marin, Eduardo [11]; Garrel, Vincent [12]; Sivo, Gaetano [13]. Precision astrometry with adaptive optics: constraints on the mutual orbit of Luhman 16AB from GeMS. *Proceedings of the SPIE*, 9909:99095T. 7/2016.

Cumming, Tom [3]. Laser traffic control system upgrades for Maunakea. *Proceedings of the SPIE,* 9909:99095J. 7/2016.

Sivo, Gaetano [1]; Garrel, Vincent [4]; Gigoux, Pedro [5]; Marin, Eduardo [7]; Rambold, William [10]; Montes, Vanessa [11]; Moreno, Cristian [12]; Donahue, Jeff [13]; Carrasco, Rodrigo [14]; Leboulleux, Lucie [17]; Trujillo, Chad [18]. Real-time implementation of an LQG tip-tilt controller for regular science observation on GeMS. *Proceedings of the SPIE,* 9909:99094Y. 7/2016.

Garrel, Vincent [3]; Marin, Eduardo [4]; Sivo, Gaetano [5]. An engineered design of a diffractive mask for high precision astrometry. *Proceedings of the SPIE,* 9909:99094E. 7/2016.

Garrel, Vincent [1]; Sivo, Gaetano [2]; Marin, Eduardo [3]; Carrasco Damele, Eleazar R.[4]; Montes, Vanessa [5]; Lazo, Manuel [6]; Gigoux, Pedro [7]; Moreno, Cristian [8]; Trujillo, Chadwick A.[9]; Donahue, Jeff [10]. Reshaping and polishing the GeMS MCAO system. *Proceedings of the SPIE,* 9909:99092F. 7/2016.

Garrel, Vincent [8]; Sivo, Gaetano [9]; Montes, Vanessa [10]; Trujillo, Chad [11]. NGS2: a focal plane array upgrade for the GeMS multiple tip-tilt wavefront sensor. *Proceedings of the SPIE,* 9909:99091X. 7/2016.

Andersen, Morten [7]. Correction of distortion for optimal image stacking in wide field adaptive optics: application to GeMS data. *Proceedings of the SPIE*, 9909:99091S. 7/2016.

Hayward, Thomas [9]; Rantakyrö, Fredrik T.[15]. Status and performance of the Gemini Planet Imager adaptive optics system. *Proceedings of the SPIE,* 9909:99090V. 7/2016.

Hayward, T. L.[1]; Rippa, M.[2]; Cavedoni, C.[4]; Galvez, R.[5]; Gausachs, G.[6]. Characterizing the vibration environments of the Gemini telescopes. *Proceedings of the SPIE,* 9906:99065N. 7/2016.

Schneider, T.[1]; Hayward, T. L.[2]; Stephens, A.[3]; Roth, K.[4]. Collimating the Gemini telescopes using a peripheral wavefront sensor. *Proceedings of the SPIE,* 9906:99063Y. 7/2016.

Schneider, T.[1]; Vucina, T.[2]; Ah Hee, C.[3]; Araya, C.[4]; Moreno, C.[5]. The Gemini Observatory protected silver coating: ten years in operation. *Proceedings of the SPIE*, 9906:990632. 7/2016.

Angeloni, Rodolfo [2]. Raman-scattered O VI λ1032 and He II λ1025 and Bipolar Outflow in the Symbiotic Star V455 Sco. *Journal of Physics: Conference Series,* 728:072014. 7/2016.

Geballe, T. R. [1]. The diffuse interstellar bands - a brief review. *Journal of Physics: Conference Series,* 728:062005. 7/ 2016.

Ladjal, Djazia [2]. The dusty side of planetary nebulae: a HerPlaNS view. *Journal of Physics: Conference Series,* 728:032012. 7/2016.

Geballe, Thomas R.[2]. Central 300 PC of the Galaxy Probed by the Infrared Spectra of H_3^+ and Co: I. Predominance of Warm and Diffuse Gas and High H_2 Ionization Rate. *71st International Symposium on Molecular Spectroscopy*: June 20-24. 6/2016.

Conn, Blair [14]. Variable Stars in the Field of the Hydra II Ultra-Faint Dwarf Galaxy. *American Astronomical Society*, #228, id.218.04. 6/2016.

Turner, James [1]. Streamlining an IRAF data reduction process Pythonically with Astropy and NDMapper. *Python in Astronomy 2016,* id.18. 3/ 2016.

Kissler-Patig, Markus [2]. Intermediate-mass black holes in globular clusters: observations and simulations. *Star Clusters and Black Holes in Galaxies across Cosmic Time, IAUS*, 312:181-188. 2/ 2016.

Chené, André-Nicolas [1]; Thomas-Osip, Joanna [2]. The Gemini Science User Support Department: A community-centered approach to user support. *American Astronomical Society*, #227, id.445.03. 1/2016.

Gimeno, German [1]; Boucher, Luc [2]; Chiboucas, Kristin [3]; Hibon, Pascale [4]; Lazo, Manuel [5]; Murowinski, Richard [6]; Rippa, Matthew [7]; Rogers, Rolando [8]; Rojas, Roberto [9]; Roth, Katherine [10]; White, John [11]. Gemini South Multi-Object Spectrograph (GMOS-S) detector Video boards upgrade: improved performance for the Hamamatsu CCDs.. *American Astronomical Society*, #227, id.445.01. 1/2016.

Miller, Bryan [1]; Schirmer, Mischa [9]. DECam Observations of the Tidal Shells Around NGC 3923. *American Astronomical Society*, #227, id.441.01. 1/2016.

Gomez, Percy L.[1]. The Dynamics of the Merging Cluster Abell 562. *American Astronomical Society*, #227, id.439.06. 1/2016.

Schirmer, Mischa [4]. A First Calibration of SBF using Mulit-Conjugate Adaptive Optics. *American Astronomical Society*, #227, id.439.02. 1/2016.

Petric, Andreea [1]. The Host Galaxies of Nearby, Optically Luminous, AGN. *American Astronomical Society*, #227, id.438.07. 1/2016.

Hibon, Pascale [19]. The DAWN and FLARE Surveys. *American Astronomical Society*, #227, id.349.07. 1/2016.

Smith, Adam B.[1]; Roth, Katherine [2]; Stephens, Andrew W.[3]. Sky Background Variability Measured on Maunakea at Gemini North Observatory. *American Astronomical Society*, #227, id.348.03. 1/2016.

Levenson, Nancy A.[1]. Dust Obscuration and Observable Emission of Active Galactic Nuclei. *American Astronomical Society*, #227, id.303.05. 1/2016.

Andersen, Morten [5]. Shocked Gas from the supernova remnant G357.7+0.3. *American Astronomical Society*, #227, id.302.05. 1/2016.

Keonaonaokalauae Acohido, Alexis Ann [1]; Michaud, Peter D.[2]. Fostering Student Awareness in Observatory STEM Careers. *American Astronomical Society*, #227, id.250.04. 1/2016.

Levenson, Nancy A.[3]. Mid-IR Observations of AGN. *American Astronomical Society*, #227, id.243.54. 1/2016.

Mason, Rachel [4]. Searching for the Nearest Extragalactic Binary Black Hole: A Spectroscopic Study of NGC 4736. *American Astronomical Society*, #227, id.243.19. 1/2016.

Madrid, Juan P.[3]. Large scale structure of the globular cluster population in Coma. *American Astronomical Society*, #227, id.240.09. 1/2016.

Labrie, Kathleen [4]. Using Microlensing Maps to Determine Spin of Black Holes. *American Astronomical Society*, #227, id.218.03. 1/2016.

Hayward, Thomas L.[5]. Mapping the Distributions of Exoplanet Populations with NICI and GPI. *Young Stars & Planets Near the Sun, IAUS,* 314:220-225. January, 2016.

Jørgensen, Inger [1]; Chiboucas, Kristin [2]; Bergmann, Marcel [3]. Early and Late Life - Bulge-Dominated Galaxies over the Last 8-9 Gyr. *Galaxies at High Redshift and Their Evolution Over Cosmic Time, IAUS,* 319:128-128. 2016.

Jørgensen, Inger [1]. Life in Low Density Environments - Field Galaxies from z=1.0 to the Present. *Galaxies at High Redshift and Their Evolution Over Cosmic Time, IAUS,* 319:127-127. 2016.

Shih, Hsin-Yi [1]. Large Scale Outflow from a Radio Loud AGN in Merging Galaxies at Redshift 2.48. *Galaxies at High Redshift and Their Evolution Over Cosmic Time*, *IAUS,* 319:67-70. 2016.

Appendix C. Publications by Users

See notes for methodology.[7][8]

Laskar, T., Alexander, K. D., Berger, E., Fong, W.-f., Margutti, R., Shivvers, I., Williams, P. K. G., Kopač, D., Kobayashi, S., Mundell, C., Gomboc, A., Zheng, W., Menten, K. M., Graham, M. L., Filippenko, A. V. A Reverse Shock in GRB 160509A. *The Astrophysical Journal*, 833:88, 12/2016.

Roy, R., Sollerman, J., Silverman, J. M., Pastorello, A., Fransson, C., Drake, A., Taddia, F., Fremling, C., Kankare, E., Kumar, B., Cappellaro, E., Bose, S., Benetti, S., Filippenko, A. V., Valenti, S., Nyholm, A., Ergon, M., Sutaria, F., Kumar, B., Pandey, S. B., Nicholl, M., Garcia-Álvarez, D., Tomasella, L., Karamehmetoglu, E., Migotto, K. SN 2012aa: A transient between Type Ibc core-collapse and superluminous supernovae. *Astronomy and Astrophysics*, 596:A67, 12/2016.

Obermeier, C., Henning, T., Schlieder, J. E., Crossfield, I. J. M., Petigura, E. A., Howard, A. W., Sinukoff, E., Isaacson, H., Ciardi, D. R., David, T. J., Hillenbrand, L. A., Beichman, C. A., Howell, S. B., Horch, E., Everett, M., Hirsch, L., Teske, J., Christiansen, J. L., Lépine, S., Aller, K. M., Liu, M. C., Saglia, R. P., Livingston, J., Kluge, M. K2 Discovers a Busy Bee: An Unusual Transiting Neptune Found in the Beehive Cluster. *The Astronomical Journal*, 152:223, 12/2016.

Ricci, T. V., Steiner, J. E., Menezes, R. B. IFU spectroscopy of 10 early-type galactic nuclei- IV. Properties of the circumnuclear stellar kinematics. *Monthly Notices of the Royal Astronomical Society*, 463:3860-3875, 12/2016.

García-Bernete, I., Ramos Almeida, C., Acosta-Pulido, J. A., Alonso-Herrero, A., González-Martín, O., Hernán-Caballero, A., Pereira-Santaella, M., Levenson, N. A., Packham, C., Perlman, E. S., Ichikawa, K., Esquej, P., Díaz-Santos, T. The nuclear and extended mid-infrared emission of Seyfert galaxies. *Monthly Notices of the Royal Astronomical Society*, 463:3531-3555, 12/2016.

Damineli, A., Almeida, L. A., Blum, R. D., Damineli, D. S. C., Navarete, F., Rubinho, M. S., Teodoro, M. Extinction law in the range 0.4–4.8 μm and the 8620 Å DIB towards the stellar cluster Westerlund 1. *Monthly Notices of the Royal Astronomical Society*, 463:2653-2666, 12/2016.

[7] Gemini maintains an up-to-date database of papers based wholly or in part on Gemini data that appear in the main refereed astronomical research journals. These journals consist of: *The Astrophysical Journal, The Astronomical Journal, Astronomy & Astrophysics, Astrophysical Journal, Publications of the Astronomical Society of the Pacific, Icarus, Science* and *Nature*. In a few exceptional and well-assessed cases, we also count papers from "secondary" journals.

[8] Gemini's qualifying criterion is the same as that used by Hubble Space Telescope and European Southern Observatory. To qualify, papers based on their output, must employ in an original way an image, spectrum or data set produced by Gemini to derive new scientific results. No attempt is made to fractionate papers per telescope used in the case of papers based on the use of two or more other facilities. Hence, the same paper may be counted several times, for example by Gemini, Keck and Subaru, if it includes data from any of these telescopes.

Piatti, A. E., Bastian, N. An Analysis of the Population of Extended Main Sequence Turn-off Clusters in the Large Magellanic Cloud. *Monthly Notices of the Royal Astronomical Society*, 463:1632-1641, 12/2016.

Schirmer, M., Malhotra, S., Levenson, N. A., Fu, H., Davies, R. L., Keel, W. C., Torrey, P., Bennert, V. N., Pancoast, A., Turner, J. E. H. About AGN ionization echoes, thermal echoes and ionization deficits in low-redshift Lyα blobs. *Monthly Notices of the Royal Astronomical Society*, 463:1554-1586, 12/2016.

de Kleer, K., de Pater, I. Spatial distribution of Io's volcanic activity from near-IR adaptive optics observations on 100 nights in 2013-2015. *Icarus*, 280:405-414, 12/2016.

de Kleer, K., de Pater, I. Time variability of Io's volcanic activity from near-IR adaptive optics observations on 100 nights in 2013-2015. *Icarus*, 280:378-404, 12/2016.

Salgado, C., Da Costa, G. S., Yong, D., Norris, J. E. Scl-1013644: a CEMP-s star in the Sculptor dwarf spheroidal galaxy. *Monthly Notices of the Royal Astronomical Society*, 463:598-603, 11/2016.

Wilson, S., Hilton, M., Rooney, P. J., Caldwell, C., Kay, S. T., Collins, C. A., McCarthy, I. G., Romer, A. K., Bermeo, A., Bernstein, R., da Costa, L., Gifford, D., Hollowood, D., Hoyle, B., Jeltema, T., Liddle, A. R., Maia, M. A. G., Mann, R. G., Mayers, J. A., Mehrtens, N., Miller, C. J., Nichol, R. C., Ogando, R., Sahlén, M., Stahl, B., Stott, J. P., Thomas, P. A., Viana, P. T. P., Wilcox, H. The XMM Cluster Survey: evolution of the velocity dispersion-temperature relation over half a Hubble time. *Monthly Notices of the Royal Astronomical Society*, 463:413-428, 11/2016.

Fuller, L., Lopez-Rodriguez, E., Packham, C., Ramos-Almeida, C., Alonso-Herrero, A., Levenson, N. A., Radomski, J., Ichikawa, K., García-Bernete, I., González-Martín, O., Díaz-Santos, T., Martínez-Paredes, M. Investigating the dusty torus of Seyfert galaxies using SOFIA/FORCAST photometry. *Monthly Notices of the Royal Astronomical Society*, 462:2618-2630, 11/2016.

Bayliss, M. B., Ruel, J., Stubbs, C. W., Allen, S. W., Applegate, D. E., Ashby, M. L. N., Bautz, M., Benson, B. A., Bleem, L. E., Bocquet, S., Brodwin, M., Capasso, R., Carlstrom, J. E., Chang, C. L., Chiu, I., Cho, H.-M., Clocchiatti, A., Crawford, T. M., Crites, A. T., de Haan, T., Desai, S., Dietrich, J. P., Dobbs, M. A., Doucouliagos, A. N., Foley, R. J., Forman, W. R., Garmire, G. P., George, E. M., Gladders, M. D., Gonzalez, A. H., Gupta, N., Halverson, N. W., Hlavacek-Larrondo, J., Hoekstra, H., Holder, G. P., Holzapfel, W. L., Hou, Z., Hrubes, J. D., Huang, N., Jones, C., Keisler, R., Knox, L., Lee, A. T., Leitch, E. M., von der Linden, A., Luong-Van, D., Mantz, A., Marrone, D. P., McDonald, M., McMahon, J. J., Meyer, S. S., Mocanu, L. M., Mohr, J. J., Murray, S. S., Padin, S., Pryke, C., Rapetti, D., Reichardt, C. L., Rest, A., Ruhl, J. E., Saliwanchik, B. R., Saro, A., Sayre, J. T., Schaffer, K. K., Schrabback, T., Shirokoff, E., Song, J., Spieler, H. G., Stalder, B., Stanford, S. A., Staniszewski, Z., Stark, A. A., Story, K. T., Vanderlinde, K., Vieira, J. D., Vikhlinin, A., Williamson, R., Zenteno, A. SPT-GMOS: A Gemini/GMOS-South Spectroscopic Survey of Galaxy Clusters in the SPT-SZ Survey. *The Astrophysical Journal Supplement Series*, 227:3, 11/2016.

Huang, F., Wang, X., Zampieri, L., Pumo, M. L., Arcavi, I., Brown, P. J., Graham, M. L., Filippenko, A. V., Zheng, W., Hosseinzadeh, G., Howell, D. A., McCully, C., Rui, L., Valenti, S., Zhang, T., Zhang, J., Zhang, K., Wang, L. Optical and Ultraviolet Observations of the Very Young Type IIP SN 2014cx in NGC 337. *The Astrophysical Journal*, 832:139, 12/2016.

Fu, H., Hennawi, J. F., Prochaska, J. X., Mutel, R., Casey, C., Cooray, A., Kereš, D., Zhang, Z.-Y., Clements, D., Isbell, J., Lang, C., McGinnis, D., Michałowski, M. J., Mooley, K., Perley, D., Stockton, A., Thompson, D. The Circumgalactic Medium of Submillimeter Galaxies. I. First Results from a Radio-identified Sample. *The Astrophysical Journal*, 832:52, 11/2016.

Saracino, S., Dalessandro, E., Ferraro, F. R., Geisler, D., Mauro, F., Lanzoni, B., Origlia, L., Miocchi, P., Cohen, R. E., Villanova, S., Moni Bidin, C. Ultra-deep GEMINI Near-infrared Observations of the Bulge Globular Cluster NGC 6624. *The Astrophysical Journal*, 832:48, 11/2016.

Mashburn, A. L., Sterling, N. C., Madonna, S., Dinerstein, H. L., Roederer, I. U., Geballe, T. R. Neutron-capture Element Abundances in Magellanic Cloud Planetary Nebulae. *The Astrophysical Journal*, 831:L3, 11/2016.

Vivas, A. K., Zinn, R., Farmer, J., Duffau, S., Ping, Y. Disentangling the Virgo Overdensity with RR Lyrae stars. *The Astrophysical Journal*, 831:165, 11/2016.

Lunnan, R., Chornock, R., Berger, E., Milisavljevic, D., Jones, D. O., Rest, A., Fong, W., Fransson, C., Margutti, R., Drout, M. R., Blanchard, P. K., Challis, P., Cowperthwaite, P. S., Foley, R. J., Kirshner, R. P., Morrell, N., Riess, A. G., Roth, K. C., Scolnic, D., Smartt, S. J., Smith, K. W., Villar, V. A., Chambers, K. C., Draper, P. W., Huber, M. E., Kaiser, N., Kudritzki, R.-P., Magnier, E. A., Metcalfe, N., Waters, C. PS1-14bj: A Hydrogen-poor Superluminous Supernova With a Long Rise and Slow Decay. *The Astrophysical Journal*, 831:144, 11/2016.

Walker, G. A. H., Campbell, E. K., Maier, J. P., Bohlender, D., Malo, L. Gas-phase Absorptions of C60+: A New Comparison with Astronomical Measurements. *The Astrophysical Journal*, 831:130, 11/2016.

Shibanov, Y., Danilenko, A., Zharikov, S., Shternin, P., Zyuzin, D. Deep Optical Observations of Unusual Neutron Star Calvera with the GTC. *The Astrophysical Journal*, 831:112, 11/2016.

Golovich, N., Dawson, W. A., Wittman, D., Ogrean, G., van Weeren, R., Bonafede, A. MC^2: Dynamical Analysis of the Merging Galaxy Cluster MACS J1149.5+2223. *The Astrophysical Journal*, 831:110, 11/2016.

Johnson-Groh, M., Marois, C., Ellison, S. L. From Exoplanets to Quasars: Detection of Potential Damped Lyα Absorbing Galaxies Using Angular Differential Imaging. *The Astrophysical Journal*, 831:49, 11/2016.

Ryde, N., Fritz, T. K., Rich, R. M., Thorsbro, B., Schultheis, M., Origlia, L., Chatzopoulos, S. Detailed Abundance Analysis of a Metal-poor Giant in the Galactic Center. *The Astrophysical Journal*, 831:40, 11/2016.

Wittrock, J. M., Kane, S. R., Horch, E. P., Hirsch, L., Howell, S. B., Ciardi, D. R., Everett, M. E., Teske, J. K. Stellar Companions to the Exoplanet Host Stars HD 2638 and HD 164509. *The Astronomical Journal*, 152:149, 11/2016.

Millar-Blanchaer, M. A., Wang, J. J., Kalas, P., Graham, J. R., Duchêne, G., Nielsen, E. L., Perrin, M., Moon, D.-S., Padgett, D., Metchev, S., Ammons, S. M., Bailey, V. P., Barman, T., Bruzzone, S., Bulger, J., Chen, C. H., Chilcote, J., Cotten, T., De Rosa, R. J., Doyon, R., Draper, Z. H., Esposito, T. M., Fitzgerald, M. P., Follette, K. B., Gerard, B. L., Greenbaum, A. Z., Hibon, P., Hinkley, S., Hung, L.-W., Ingraham, P., Johnson-Groh, M., Konopacky, Q., Larkin, J. E., Macintosh, B., Maire, J., Marchis, F., Marley, M. S., Marois, C., Matthews, B. C., Oppenheimer, R., Palmer, D., Patience, J., Poyneer, L., Pueyo, L., Rajan, A., Rameau, J., Rantakyrö, F. T., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Vega, D., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S., Wolff, S. Imaging an 80 au Radius Dust Ring around the F5V Star HD 157587. *The Astronomical Journal*, 152:128, 11/2016.

Gizis, J. E., Williams, P. K. G., Burgasser, A. J., Libralato, M., Nardiello, D., Piotto, G., Bedin, L. R., Berger, E., Paudel, R. WISEP J060738.65+242953.4: A Nearby Pole-on L8 Brown Dwarf with Radio Emission. *The Astronomical Journal*, 152:123, 11/2016.

Tokovinin, A., Horch, E. P. Speckle Interferometry of Secondary Components in Nearby Visual Binaries. *The Astronomical Journal*, 152:116, 11/2016.

Alexandersen, M., Gladman, B., Kavelaars, J. J., Petit, J.-M., Gwyn, S. D. J., Shankman, C. J., Pike, R. E. A Carefully Characterized and Tracked Trans-Neptunian Survey: The Size distribution of the Plutinos and the Number of Neptunian Trojans. *The Astronomical Journal*, 152:111, 11/2016.

Smith Castelli, A. V., Faifer, F. R., Escudero, C. G. Stellar systems in the direction of the Hickson Compact Group 44. I. Low surface brightness galaxies. *Astronomy and Astrophysics*, 596:A23, 11/2016.

Mizuki, T., Yamada, T., Carson, J. C., Kuzuhara, M., Nakagawa, T., Nishikawa, J., Sitko, M. L., Kudo, T., Kusakabe, N., Hashimoto, J., Abe, L., Brander, W., Brandt, T. D., Egner, S., Feldt, M., Goto, M., Grady, C. A., Guyon, O., Hayano, Y., Hayashi, M., Hayashi, S. S., Henning, T., Hodapp, K. W., Ishii, M., Iye, M., Janson, M., Kandori, R., Knapp, G. R., Kwon, J., Matsuo, T., McElwain, M. W., Miyama, S., Morino, J., Moro-Martin, A., Nishimura, T., Pyo, T., Serabyn, E., Suenaga, T., Suto, H., Suzuki, R., Takahashi, Y. H., Takami, M., Takato, N., Terada, H., Thalmann, C., Turner, E. L., Watanabe, M., Wisniewski, J., Takami, H., Usuda, T., Tamura, M. High-contrast imaging of ε Eridani with ground-based instruments. *Astronomy and Astrophysics*, 595:A79, 11/2016.

Tappert, C., Barria, D., Fuentes Morales, I., Vogt, N., Ederoclite, A., Schmidtobreick, L. Life after eruption - VI. Recovery of the old novae EL Aql, V606 Aql, V908 Oph, V1149 Sgr, V1583 Sgr and V3964 Sgr. *Monthly Notices of the Royal Astronomical Society*, 462:1371-1381, 10/2016.

Sesto, L. A., Faifer, F. R., Forte, J. C. The complex star cluster system of NGC 1316 (Fornax A). *Monthly Notices of the Royal Astronomical Society*, 461:4260-4275, 10/2016.

Lau, M. W., Prochaska, J. X., Hennawi, J. F. Quasars Probing Quasars. VIII. The Physical Properties of the Cool Circumgalactic Medium Surrounding z ~ 2–3 Massive

Galaxies Hosting Quasars. *The Astrophysical Journal Supplement Series*, 226:25, 10/2016.

Robert, J., Gagné, J., Artigau, É., Lafrenière, D., Nadeau, D., Doyon, R., Malo, L., Albert, L., Simard, C., Bardalez Gagliuffi, D. C., Burgasser, A. J. A Brown Dwarf Census from the SIMP Survey. *The Astrophysical Journal*, 830:144, 10/2016.

Leggett, S. K., Cushing, M. C., Hardegree-Ullman, K. K., Trucks, J. L., Marley, M. S., Morley, C. V., Saumon, D., Carey, S. J., Fortney, J. J., Gelino, C. R., Gizis, J. E., Kirkpatrick, J. D., Mace, G. N. Observed Variability at 1 and 4 μm in the Y0 Brown Dwarf WISEP J173835.52+273258.9. *The Astrophysical Journal*, 830:141, 10/2016.

Brittain, S. D., Najita, J. R., Carr, J. S., Ádámkovics, M., Reynolds, N. A Study of Ro-vibrational OH Emission from Herbig Ae/Be Stars. *The Astrophysical Journal*, 830:112, 10/2016.

Fulton, B. J., Howard, A. W., Weiss, L. M., Sinukoff, E., Petigura, E. A., Isaacson, H., Hirsch, L., Marcy, G. W., Henry, G. W., Grunblatt, S. K., Huber, D., von Braun, K., Boyajian, T. S., Kane, S. R., Wittrock, J., Horch, E. P., Ciardi, D. R., Howell, S. B., Wright, J. T., Ford, E. B. Three Temperate Neptunes Orbiting Nearby Stars. *The Astrophysical Journal*, 830:46, 10/2016.

Villar, V. A., Berger, E., Chornock, R., Margutti, R., Laskar, T., Brown, P. J., Blanchard, P. K., Czekala, I., Lunnan, R., Reynolds, M. T. The Intermediate Luminosity Optical Transient SN 2010da: The Progenitor, Eruption, and Aftermath of a Peculiar Supergiant High-mass X-Ray Binary. *The Astrophysical Journal*, 830:11, 10/2016.

Wang, J. J., Graham, J. R., Pueyo, L., Kalas, P., Millar-Blanchaer, M. A., Ruffio, J.-B., De Rosa, R. J., Ammons, S. M., Arriaga, P., Bailey, V. P., Barman, T. S., Bulger, J., Burrows, A. S., Cardwell, A., Chen, C. H., Chilcote, J. K., Cotten, T., Fitzgerald, M. P., Follette, K. B., Doyon, R., Duchêne, G., Greenbaum, A. Z., Hibon, P., Hung, L.-W., Ingraham, P., Konopacky, Q. M., Larkin, J. E., Macintosh, B., Maire, J., Marchis, F., Marley, M. S., Marois, C., Metchev, S., Nielsen, E. L., Oppenheimer, R., Palmer, D. W., Patel, R., Patience, J., Perrin, M. D., Poyneer, L. A., Rajan, A., Rameau, J., Rantakyrö, F. T., Savransky, D., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Vasisht, G., Vega, D., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S. J., Wolff, S. G. The Orbit and Transit Prospects for β Pictoris b Constrained with One Milliarcsecond Astrometry. *The Astronomical Journal*, 152:97, 10/2016.

Esposito, T. M., Fitzgerald, M. P., Graham, J. R., Kalas, P., Lee, E. J., Chiang, E., Duchêne, G., Wang, J., Millar-Blanchaer, M. A., Nielsen, E., Ammons, S. M., Bruzzone, S., De Rosa, R. J., Draper, Z. H., Macintosh, B., Marchis, F., Metchev, S. A., Perrin, M., Pueyo, L., Rajan, A., Rantakyrö, F. T., Vega, D., Wolff, S. Bringing “The Moth” to Light: A Planet-sculpting Scenario for the HD 61005 Debris Disk. *The Astronomical Journal*, 152:85, 10/2016.

Massari, D., Fiorentino, G., McConnachie, A., Bellini, A., Tolstoy, E., Turri, P., Andersen, D., Bono, G., Stetson, P. B., Veran, J.-P. Astrometry with MCAO: HST-GeMS proper motions in the globular cluster NGC 6681. *Astronomy and Astrophysics*, 595:L2, 10/2016.

Lorenzo-Oliveira, D., Porto de Mello, G. F., Schiavon, R. P. The age-mass-metallicity-activity relation for solar-type stars: comparisons with asteroseismology and the NGC 188 open cluster. *Astronomy and Astrophysics*, 594:L3, 10/2016.

Galicher, R., Marois, C., Macintosh, B., Zuckerman, B., Barman, T., Konopacky, Q., Song, I., Patience, J., Lafrenière, D., Doyon, R., Nielsen, E. L. The International Deep Planet Survey. II. The frequency of directly imaged giant exoplanets with stellar mass. *Astronomy and Astrophysics*, 594:A63, 10/2016.

Biviano, A., van der Burg, R. F. J., Muzzin, A., Sartoris, B., Wilson, G., Yee, H. K. C. The dynamics of z ~ 1 clusters of galaxies from the GCLASS survey. *Astronomy and Astrophysics*, 594:A51, 10/2016.

Husemann, B., Scharwächter, J., Bennert, V. N., Mainieri, V., Woo, J.-H., Kakkad, D. Large-scale outflows in luminous QSOs revisited. The impact of beam smearing on AGN feedback efficiencies. *Astronomy and Astrophysics*, 594:A44, 10/2016.

Paron, S., Fariña, C., Ortega, M. E. Near-IR imaging toward a puzzling young stellar object precessing jet. *Astronomy and Astrophysics*, 593:A132, 10/2016.

Kraus, M., Cidale, L. S., Arias, M. L., Maravelias, G., Nickeler, D. H., Torres, A. F., Borges Fernandes, M., Aret, A., Curé, M., Vallverdú, R., Barbá, R. H. Inhomogeneous molecular ring around the B[e] supergiant LHA 120-S 73. *Astronomy and Astrophysics*, 593:A112, 10/2016.

Lee, C.-H. AGB stars in Leo P and their use as metallicity probes. *Monthly Notices of the Royal Astronomical Society*, 461:L37-L40, 9/2016.

Yuan, F., Jerkstrand, A., Valenti, S., Sollerman, J., Seitenzahl, I. R., Pastorello, A., Schulze, S., Chen, T.-W., Childress, M. J., Fraser, M., Fremling, C., Kotak, R., Ruiter, A. J., Schmidt, B. P., Smartt, S. J., Taddia, F., Terreran, G., Tucker, B. E., Barbarino, C., Benetti, S., Elias-Rosa, N., Gal-Yam, A., Howell, D. A., Inserra, C., Kankare, E., Lee, M. Y., Li, K. L., Maguire, K., Margheim, S., Mehner, A., Ochner, P., Sullivan, M., Tomasella, L., Young, D. R. 450 d of Type II SN 2013ej in optical and near-infrared. *Monthly Notices of the Royal Astronomical Society*, 461:2003-2018, 9/2016.

Hibon, P., Garrel, V., Neichel, B., Prout, B., Rigaut, F., Koning, A., Carrasco, E. R., Gimeno, G., Pessev, P. First performance of the GeMS + GMOS system - 1. Imaging. *Monthly Notices of the Royal Astronomical Society*, 461:507-518, 9/2016.

Sifón, C., Battaglia, N., Hasselfield, M., Menanteau, F., Barrientos, L. F., Bond, J. R., Crichton, D., Devlin, M. J., Dünner, R., Hilton, M., Hincks, A. D., Hlozek, R., Huffenberger, K. M., Hughes, J. P., Infante, L., Kosowsky, A., Marsden, D., Marriage, T. A., Moodley, K., Niemack, M. D., Page, L. A., Spergel, D. N., Staggs, S. T., Trac, H., Wollack, E. J. The Atacama Cosmology Telescope: dynamical masses for 44 SZ-selected galaxy clusters over 755 square degrees. *Monthly Notices of the Royal Astronomical Society*, 461:248-270, 9/2016.

Rodruck, M., Konstantopoulos, I., Knierman, K., Fedotov, K., Mullan, B., Gallagher, S., Durrell, P., Ciardullo, R., Gronwall, C., Charlton, J. A tale of two tails: exploring stellar populations in the tidal tails of NGC 3256. *Monthly Notices of the Royal Astronomical Society*, 461:36-50, 9/2016.

Crossfield, I. J. M., Ciardi, D. R., Petigura, E. A., Sinukoff, E., Schlieder, J. E., Howard, A. W., Beichman, C. A., Isaacson, H., Dressing, C. D., Christiansen, J. L., Fulton, B. J., Lépine, S., Weiss, L., Hirsch, L., Livingston, J., Baranec, C., Law, N. M., Riddle, R., Ziegler, C., Howell, S. B., Horch, E., Everett, M., Teske, J., Martinez, A. O., Obermeier, C., Benneke, B., Scott, N., Deacon, N., Aller, K. M., Hansen, B. M. S., Mancini, L., Ciceri, S., Brahm, R., Jordán, A., Knutson, H. A., Henning, T., Bonnefoy, M., Liu, M. C., Crepp, J. R., Lothringer, J., Hinz, P., Bailey, V., Skemer, A., Defrere, D. 197 Candidates and 104 Validated Planets in K2's First Five Fields. *The Astrophysical Journal Supplement Series*, 226:7, 9/2016.

Konopacky, Q. M., Rameau, J., Duchêne, G., Filippazzo, J. C., Giorla Godfrey, P. A., Marois, C., Nielsen, E. L., Pueyo, L., Rafikov, R. R., Rice, E. L., Wang, J. J., Ammons, S. M., Bailey, V. P., Barman, T. S., Bulger, J., Bruzzone, S., Chilcote, J. K., Cotten, T., Dawson, R. I., De Rosa, R. J., Doyon, R., Esposito, T. M., Fitzgerald, M. P., Follette, K. B., Goodsell, S., Graham, J. R., Greenbaum, A. Z., Hibon, P., Hung, L.-W., Ingraham, P., Kalas, P., Lafrenière, D., Larkin, J. E., Macintosh, B. A., Maire, J., Marchis, F., Marley, M. S., Matthews, B. C., Metchev, S., Millar-Blanchaer, M. A., Oppenheimer, R., Palmer, D. W., Patience, J., Perrin, M. D., Poyneer, L. A., Rajan, A., Rantakyrö, F. T., Savransky, D., Schneider, A. C., Sivaramakrishnan, A., Song, I., Soummer, R., Thomas, S., Wallace, J. K., Ward-Duong, K., Wiktorowicz, S. J., Wolff, S. G. Discovery of a Substellar Companion to the Nearby Debris Disk Host HR 2562. *The Astrophysical Journal*, 829:L4, 9/2016.

Howell, S. B., Everett, M. E., Horch, E. P., Winters, J. G., Hirsch, L., Nusdeo, D., Scott, N. J. Speckle Imaging Excludes Low-mass Companions Orbiting the Exoplanet Host Star TRAPPIST-1. *The Astrophysical Journal*, 829:L2, 9/2016.

Arrigoni Battaia, F., Hennawi, J. F., Cantalupo, S., Prochaska, J. X. The Stacked LYα Emission Profile from the Circum-Galactic Medium of z ˜ 2 Quasars. *The Astrophysical Journal*, 829:3, 9/2016.

Nicholl, M., Berger, E., Margutti, R., Chornock, R., Blanchard, P. K., Jerkstrand, A., Smartt, S. J., Arcavi, I., Challis, P., Chambers, K. C., Chen, T.-W., Cowperthwaite, P. S., Gal-Yam, A., Hosseinzadeh, G., Howell, D. A., Inserra, C., Kankare, E., Magnier, E. A., Maguire, K., Mazzali, P. A., McCully, C., Milisavljevic, D., Smith, K. W., Taubenberger, S., Valenti, S., Wainscoat, R. J., Yaron, O., Young, D. R. Superluminous Supernova SN 2015bn in the Nebular Phase: Evidence for the Engine-powered Explosion of a Stripped Massive Star. *The Astrophysical Journal*, 828:L18, 9/2016.

van Dokkum, P., Abraham, R., Brodie, J., Conroy, C., Danieli, S., Merritt, A., Mowla, L., Romanowsky, A., Zhang, J. A High Stellar Velocity Dispersion and ~100 Globular Clusters for the Ultra-diffuse Galaxy Dragonfly 44. *The Astrophysical Journal*, 828:L6, 9/2016.

Andrews, J. J., Agüeros, M., Brown, W. R., Gosnell, N. M., Gianninas, A., Kilic, M., Koester, D. Today a Duo, but Once a Trio? The Double White Dwarf HS 2220+2146 May Be a Post-blue Straggler Binary. *The Astrophysical Journal*, 828:38, 9/2016.

Luhman, K. L., Esplin, T. L. The Spectral Energy Distribution of the Coldest Known Brown Dwarf. *The Astronomical Journal*, 152:78, 9/2016.

Nugent, C. R., Mainzer, A., Bauer, J., Cutri, R. M., Kramer, E. A., Grav, T., Masiero, J., Sonnett, S., Wright, E. L. NEOWISE Reactivation Mission Year Two: Asteroid Diameters and Albedos. *The Astronomical Journal*, 152:63, 9/2016.

Fremling, C., Sollerman, J., Taddia, F., Ergon, M., Fraser, M., Karamehmetoglu, E., Valenti, S., Jerkstrand, A., Arcavi, I., Bufano, F., Elias Rosa, N., Filippenko, A. V., Fox, D., Gal-Yam, A., Howell, D. A., Kotak, R., Mazzali, P., Milisavljevic, D., Nugent, P. E., Nyholm, A., Pian, E., Smartt, S. PTF12os and iPTF13bvn. Two stripped-envelope supernovae from low-mass progenitors in NGC 5806. *Astronomy and Astrophysics*, 593:A68, 9/2016.

Tsang, C., Spencer, J., Lellouch, E., Lopez-Valverde, M., Richter, M. The collapse of Io's primary atmosphere in Jupiter eclipse. *Journal of Geophysical Research Planets*, 121:1400-1410, 8/2016.

Velasco, S., Rebolo, R., Oscoz, A., Mackay, C., Labadie, L., Pérez Garrido, A., Crass, J., Díaz-Sánchez, A., Femenía, B., González-Escalera, V., King, D. L., López, R. L., Puga, M., Rodríguez-Ramos, L. F., Zuther, J. High spatial resolution optical imaging of the multiple T Tauri system Lk Hα 262/Lk Hα 263. *Monthly Notices of the Royal Astronomical Society*, 460:3519-3528, 8/2016.

Takáts, K., Pignata, G., Bersten, M., Rojas Kaufmann, M. L., Anderson, J. P., Folatelli, G., Hamuy, M., Stritzinger, M., Haislip, J. B., LaCluyze, A. P., Moore, J. P., Reichart, D. Optical photometry and spectroscopy of the 1987A-like supernova 2009mw. *Monthly Notices of the Royal Astronomical Society*, 460:3447-3457, 8/2016.

Britt, C. T., Maccarone, T. J., Green, J. D., Jonker, P. G., Hynes, R. I., Torres, M. A. P., Strader, J., Chomiuk, L., Salinas, R., Lucas, P., Contreras Peña, C., Kurtev, R., Heinke, C., Smith, L., Wright, N. J., Johnson, C., Steeghs, D., Nelemans, G. Discovery of a long-lived, high-amplitude dusty infrared transient. *Monthly Notices of the Royal Astronomical Society*, 460:2822-2833, 8/2016.

Yong, D., Da Costa, G. S., Norris, J. E. Confirming the intrinsic abundance spread in the globular cluster NGC 6273 (M19) with calcium triplet spectroscopy. *Monthly Notices of the Royal Astronomical Society*, 460:1846-1853, 8/2016.

Combi, J. A., García, F., Rodríguez, M. J., Gamen, R., Cellone, S. A. Discovery of a deep Seyfert-2 galaxy at z = 0.222 behind NGC 300. *Monthly Notices of the Royal Astronomical Society*, 460:1640-1644, 8/2016.

Smartt, S. J., Chambers, K. C., Smith, K. W., Huber, M. E., Young, D. R., Chen, T.-W., Inserra, C., Wright, D. E., Coughlin, M., Denneau, L., Flewelling, H., Heinze, A., Jerkstrand, A., Magnier, E. A., Maguire, K., Mueller, B., Rest, A., Sherstyuk, A., Stalder, B., Schultz, A. S. B., Stubbs, C. W., Tonry, J., Waters, C., Wainscoat, R. J., Della Valle, M., Dennefeld, M., Dimitriadis, G., Firth, R. E., Fraser, M., Frohmaier, C., Gal-Yam, A., Harmanen, J., Kankare, E., Kotak, R., Kromer, M., Mandel, I., Sollerman, J., Gibson, B., Primak, N., Willman, M. A Search for an Optical Counterpart to the Gravitational-wave Event GW151226. *The Astrophysical Journal*, 827:L40, 8/2016.

Hankins, M. J., Lau, R. M., Morris, M. R., Sanchez-Bermudez, J., Pott, J. U., Adams, J. D., Herter, T. L. Infrared Observations of the Quintuplet Proper Members using SOFIA/FORCAST and Gemini/TReCS. *The Astrophysical Journal*, 827:136, 8/2016.

Troja, E., Sakamoto, T., Cenko, S. B., Lien, A., Gehrels, N., Castro-Tirado, A. J., Ricci, R., Capone, J., Toy, V., Kutyrev, A., Kawai, N., Cucchiara, A., Fruchter, A., Gorosabel, J., Jeong, S., Levan, A., Perley, D., Sanchez-Ramirez, R., Tanvir, N., Veilleux, S. An Achromatic Break in the Afterglow of the Short GRB 140903A: Evidence for a Narrow Jet. *The Astrophysical Journal*, 827:102, 8/2016.

Shimonishi, T., Onaka, T., Kawamura, A., Aikawa, Y. The Detection of a Hot Molecular Core in the Large Magellanic Cloud with ALMA. *The Astrophysical Journal*, 827:72, 8/2016.

Luhman, K. L., Esplin, T. L., Loutrel, N. P. A Census of Young Stars and Brown Dwarfs in IC 348 and NGC 1333. *The Astrophysical Journal*, 827:52, 8/2016.

Nord, B., Buckley-Geer, E., Lin, H., Diehl, H. T., Helsby, J., Kuropatkin, N., Amara, A., Collett, T., Allam, S., Caminha, G. B., De Bom, C., Desai, S., Dúmet-Montoya, H., Pereira, M. E. d. S., Finley, D. A., Flaugher, B., Furlanetto, C., Gaitsch, H., Gill, M., Merritt, K. W., More, A., Tucker, D., Saro, A., Rykoff, E. S., Rozo, E., Birrer, S., Abdalla, F. B., Agnello, A., Auger, M., Brunner, R. J., Carrasco Kind, M., Castander, F. J., Cunha, C. E., da Costa, L. N., Foley, R. J., Gerdes, D. W., Glazebrook, K., Gschwend, J., Hartley, W., Kessler, R., Lagattuta, D., Lewis, G., Maia, M. A. G., Makler, M., Menanteau, F., Niernberg, A., Scolnic, D., Vieira, J. D., Gramillano, R., Abbott, T. M. C., Banerji, M., Benoit-Lévy, A., Brooks, D., Burke, D. L., Capozzi, D., Carnero Rosell, A., Carretero, J., D'Andrea, C. B., Dietrich, J. P., Doel, P., Evrard, A. E., Frieman, J., Gaztanaga, E., Gruen, D., Honscheid, K., James, D. J., Kuehn, K., Li, T. S., Lima, M., Marshall, J. L., Martini, P., Melchior, P., Miquel, R., Neilsen, E., Nichol, R. C., Ogando, R., Plazas, A. A., Romer, A. K., Sako, M., Sanchez, E., Scarpine, V., Schubnell, M., Sevilla-Noarbe, I., Smith, R. C., Soares-Santos, M., Sobreira, F., Suchyta, E., Swanson, M. E. C., Tarle, G., Thaler, J., Walker, A. R., Wester, W., Zhang, Y., DES Collaboration Observation and Confirmation of Six Strong-lensing Systems in the Dark Energy Survey Science Verification Data. *The Astrophysical Journal*, 827:51, 8/2016.

Skemer, A. J., Morley, C. V., Allers, K. N., Geballe, T. R., Marley, M. S., Fortney, J. J., Faherty, J. K., Bjoraker, G. L., Lupu, R. The First Spectrum of the Coldest Brown Dwarf. *The Astrophysical Journal*, 826:L17, 8/2016.

Draper, Z. H., Duchêne, G., Millar-Blanchaer, M. A., Matthews, B. C., Wang, J. J., Kalas, P., Graham, J. R., Padgett, D., Ammons, S. M., Bulger, J., Chen, C., Chilcote, J. K., Doyon, R., Fitzgerald, M. P., Follette, K. B., Gerard, B., Greenbaum, A. Z., Hibon, P., Hinkley, S., Macintosh, B., Ingraham, P., Lafrenière, D., Marchis, F., Marois, C., Nielsen, E. L., Oppenheimer, R., Patel, R., Patience, J., Perrin, M., Pueyo, L., Rajan, A., Rameau, J., Sivaramakrishnan, A., Vega, D., Ward-Duong, K., Wolff, S. G. The Peculiar Debris Disk of HD 111520 as Resolved by the Gemini Planet Imager. *The Astrophysical Journal*, 826:147, 8/2016.

Bond, H. E., Ciardullo, R., Esplin, T. L., Hawley, S. A., Liebert, J., Munari, U. The Nucleus of the Planetary Nebula EGB 6 as a Post-Mira Binary. *The Astrophysical Journal*, 826:139, 8/2016.

Toshikawa, J., Kashikawa, N., Overzier, R., Malkan, M. A., Furusawa, H., Ishikawa, S., Onoue, M., Ota, K., Tanaka, M., Niino, Y., Uchiyama, H. A Systematic Survey of Protoclusters at z ~ 3-6 in the CFHTLS Deep Fields. *The Astrophysical Journal*, 826:114, 8/2016.

Spilker, J. S., Marrone, D. P., Aravena, M., Béthermin, M., Bothwell, M. S., Carlstrom, J. E., Chapman, S. C., Crawford, T. M., de Breuck, C., Fassnacht, C. D., Gonzalez, A. H., Greve, T. R., Hezaveh, Y., Litke, K., Ma, J., Malkan, M., Rotermund, K. M., Strandet, M., Vieira, J. D., Weiss, A., Welikala, N. ALMA Imaging and Gravitational Lens Models of South Pole Telescope—Selected Dusty, Star-Forming Galaxies at High Redshifts. *The Astrophysical Journal*, 826:112, 8/2016.

Gullikson, K., Kraus, A., Dodson-Robinson, S. The Close Companion Mass-ratio Distribution of Intermediate-mass Stars. *The Astronomical Journal*, 152:40, 8/2016.

Molina-Lera, J. A., Baume, G., Gamen, R., Costa, E., Carraro, G. Stellar populations in the Carina region. The Galactic plane at l = 291°. *Astronomy and Astrophysics*, 592:A149, 8/2016.

Tylenda, R., Kamiński, T. Evolution of the stellar-merger red nova V1309 Scorpii: Spectral energy distribution analysis. *Astronomy and Astrophysics*, 592:A134, 8/2016.

Taddia, F., Fremling, C., Sollerman, J., Corsi, A., Gal-Yam, A., Karamehmetoglu, E., Lunnan, R., Bue, B., Ergon, M., Kasliwal, M., Vreeswijk, P. M., Wozniak, P. R. iPTF15dtg: a double-peaked Type Ic supernova from a massive progenitor. *Astronomy and Astrophysics*, 592:A89, 8/2016.

Mackey, A. D., Beasley, M. A., Leaman, R. No sign (yet) of intergalactic globular clusters in the Local Group. *Monthly Notices of the Royal Astronomical Society*, 460:L114-L118, 7/2016.

Finn, C. W., Morris, S. L., Tejos, N., Crighton, N. H. M., Perry, R., Fumagalli, M., Bielby, R., Theuns, T., Schaye, J., Shanks, T., Liske, J., Gunawardhana, M. L. P., Bartle, S. On the connection between the metal-enriched intergalactic medium and galaxies: an O VI-galaxy cross-correlation study at z < 1. *Monthly Notices of the Royal Astronomical Society*, 460:590-616, 7/2016.

Lena, D., Robinson, A., Storchi-Bergmann, T., Couto, G. S., Schnorr-Müller, A., Riffel, R. A. Ionized gas kinematics within the inner kiloparsec of the Seyfert galaxy NGC 1365. *Monthly Notices of the Royal Astronomical Society*, 459:4485-4498, 7/2016.

Knowles, K., Intema, H. T., Baker, A. J., Bharadwaj, V., Bond, J. R., Cress, C., Gupta, N., Hajian, A., Hilton, M., Hincks, A. D., Hlozek, R., Hughes, J. P., Lindner, R. R., Marriage, T. A., Menanteau, F., Moodley, K., Niemack, M. D., Reese, E. D., Sievers, J., Sifón, C., Srianand, R., Wollack, E. J. A giant radio halo in a low-mass SZ-selected galaxy cluster: ACT-CL J0256.5+0006. *Monthly Notices of the Royal Astronomical Society*, 459:4240-4258, 7/2016.

Valenti, S., Howell, D. A., Stritzinger, M. D., Graham, M. L., Hosseinzadeh, G., Arcavi, I., Bildsten, L., Jerkstrand, A., McCully, C., Pastorello, A., Piro, A. L., Sand, D., Smartt, S. J., Terreran, G., Baltay, C., Benetti, S., Brown, P., Filippenko, A. V., Fraser, M., Rabinowitz, D., Sullivan, M., Yuan, F. The diversity of Type II supernova versus the similarity in their progenitors. *Monthly Notices of the Royal Astronomical Society*, 459:3939-3962, 7/2016.

Inserra, C., Fraser, M., Smartt, S. J., Benetti, S., Chen, T.-W., Childress, M., Gal-Yam, A., Howell, D. A., Kangas, T., Pignata, G., Polshaw, J., Sullivan, M., Smith, K. W., Valenti, S., Young, D. R., Parker, S., Seccull, T., McCrum, M. On Type IIn/Ia-CSM

supernovae as exemplified by SN 2012ca*. *Monthly Notices of the Royal Astronomical Society*, 459:2721-2740, 7/2016.

Faherty, J. K., Riedel, A. R., Cruz, K. L., Gagne, J., Filippazzo, J. C., Lambrides, E., Fica, H., Weinberger, A., Thorstensen, J. R., Tinney, C. G., Baldassare, V., Lemonier, E., Rice, E. L. Population Properties of Brown Dwarf Analogs to Exoplanets. *The Astrophysical Journal Supplement Series*, 225:10, 7/2016.

Eisner, J. A., Bally, J. M., Ginsburg, A., Sheehan, P. D. Protoplanetary Disks in the Orion OMC1 Region Imaged with ALMA. *The Astrophysical Journal*, 826:16, 7/2016.

Laganá, T. F., Ulmer, M. P., Martins, L. P., da Cunha, E. Star Formation Activity in a Young Galaxy Cluster at Z = 0.866. *The Astrophysical Journal*, 825:108, 7/2016.

Barbosa, C. L., Blum, R. D., Damineli, A., Conti, P. S., Gusmão, D. M. A Mid-Infrared View of the High Mass Star Formation Region W51A. *The Astrophysical Journal*, 825:54, 7/2016.

Casertano, S., Riess, A. G., Anderson, J., Anderson, R. I., Bowers, J. B., Clubb, K. I., Cukierman, A. R., Filippenko, A. V., Graham, M. L., MacKenty, J. W., Melis, C., Tucker, B. E., Upadhya, G. Parallax of Galactic Cepheids from Spatially Scanning the Wide Field Camera 3 on the Hubble Space Telescope: The Case of SS Canis Majoris. *The Astrophysical Journal*, 825:11, 7/2016.

Posselt, B., Luhman, K. L. Gemini J-band observations of RX J0806.4-4123. *Astronomische Nachrichten*, 337:576, 7/2016.

Bernard, A., Neichel, B., Samal, M. R., Zavagno, A., Andersen, M., Evans, C. J., Plana, H., Fusco, T. Deep GeMS/GSAOI near-infrared observations of N159W in the Large Magellanic Cloud. *Astronomy and Astrophysics*, 592:A77, 7/2016.

Donati, J. F., Moutou, C., Malo, L., Baruteau, C., Yu, L., Hébrard, E., Hussain, G., Alencar, S., Ménard, F., Bouvier, J., Petit, P., Takami, M., Doyon, R., Cameron, A. C. A hot Jupiter orbiting a 2-million-year-old solar-mass T Tauri star. *Nature*, 534:662-666, 6/2016.

Tomasella, L., Cappellaro, E., Benetti, S., Pastorello, A., Hsiao, E. Y., Sand, D. J., Stritzinger, M., Valenti, S., McCully, C., Arcavi, I., Elias-Rosa, N., Harmanen, J., Harutyunyan, A., Hosseinzadeh, G., Howell, D. A., Kankare, E., Morales-Garoffolo, A., Taddia, F., Tartaglia, L., Terreran, G., Turatto, M. Optical and near-infrared observations of SN 2014ck: an outlier among the Type Iax supernovae. *Monthly Notices of the Royal Astronomical Society*, 459:1018-1038, 6/2016.

Yong, D., Casagrande, L., Venn, K. A., Chené, A.-N., Keown, J., Malo, L., Martioli, E., Alves-Brito, A., Asplund, M., Dotter, A., Martell, S. L., Meléndez, J., Schlesinger, K. J. GRACES observations of young [α/Fe]-rich stars. *Monthly Notices of the Royal Astronomical Society*, 459:487-495, 6/2016.

Lopez-Rodriguez, E., Packham, C., Roche, P. F., Alonso-Herrero, A., Díaz-Santos, T., Nikutta, R., González-Martín, O., Álvarez, C. A., Esquej, P., Espinosa, J. M. R., Perlman, E., Ramos Almeida, C., Telesco, C. M. Mid-infrared imaging- and spectro-polarimetric subarcsecond observations of NGC 1068. *Monthly Notices of the Royal Astronomical Society*, 458:3851-3866, 6/2016.

Irwin, P. G. J., Fletcher, L. N., Tice, D., Owen, S. J., Orton, G. S., Teanby, N. A., Davis, G. R. Time variability of Neptune's horizontal and vertical cloud structure revealed by VLT/SINFONI and Gemini/NIFS from 2009 to 2013. *Icarus*, 271:418-437, 6/2016.

De Rosa, R. J., Rameau, J., Patience, J., Graham, J. R., Doyon, R., Lafrenière, D., Macintosh, B., Pueyo, L., Rajan, A., Wang, J. J., Ward-Duong, K., Hung, L.-W., Maire, J., Nielsen, E. L., Ammons, S. M., Bulger, J., Cardwell, A., Chilcote, J. K., Galvez, R. L., Gerard, B. L., Goodsell, S., Hartung, M., Hibon, P., Ingraham, P., Johnson-Groh, M., Kalas, P., Konopacky, Q. M., Marchis, F., Marois, C., Metchev, S., Morzinski, K. M., Oppenheimer, R., Perrin, M. D., Rantakyrö, F. T., Savransky, D., Thomas, S. Spectroscopic Characterization of HD 95086 b with the Gemini Planet Imager. *The Astrophysical Journal*, 824:121, 6/2016.

Pueyo, L. Detection and Characterization of Exoplanets using Projections on Karhunen Loeve Eigenimages: Forward Modeling. *The Astrophysical Journal*, 824:117, 6/2016.

Ofek, E. O., Cenko, S. B., Shaviv, N. J., Duggan, G., Strotjohann, N.-L., Rubin, A., Kulkarni, S. R., Gal-Yam, A., Sullivan, M., Cao, Y., Nugent, P. E., Kasliwal, M. M., Sollerman, J., Fransson, C., Filippenko, A. V., Perley, D. A., Yaron, O., Laher, R. PTF13efv—An Outburst 500 Days Prior to the SNHunt 275 Explosion and Its Radiative Efficiency. *The Astrophysical Journal*, 824:6, 6/2016.

Leggett, S. K., Tremblin, P., Saumon, D., Marley, M. S., Morley, C. V., Amundsen, D. S., Baraffe, I., Chabrier, G. Near-infrared Spectroscopy of the Y0 WISEP J173835.52+273258.9 and the Y1 WISE J035000.32-565830.2: The Importance of Non-equilibrium Chemistry. *The Astrophysical Journal*, 824:2, 6/2016.

Ballering, N. P., Su, K. Y. L., Rieke, G. H., Gáspár, A. A Comprehensive Dust Model Applied to the Resolved Beta Pictoris Debris Disk from Optical to Radio Wavelengths. *The Astrophysical Journal*, 823:108, 6/2016.

Nilo Castellón, J. L., Alonso, M. V., García Lambas, D., Valotto, C., O'Mill, A. L., Cuevas, H., Carrasco, E. R., Ramírez, A., Astudillo, J. M., Ramos, F., Jaque Arancibia, M., Ulloa, N., Órdenes, Y. Low X-Ray Luminosity Galaxy Clusters: Main Goals, Sample Selection, Photometric and Spectroscopic Observations. *The Astronomical Journal*, 151:151, 6/2016.

Couto, G. S., Storchi-Bergmann, T., Robinson, A., Riffel, R. A., Kharb, P., Lena, D., Schnorr-Müller, A. Integral field spectroscopy of the circum-nuclear region of the radio Galaxy Pictor A. *Monthly Notices of the Royal Astronomical Society*, 458:855-867, 5/2016.

Narayan, G., Rest, A., Tucker, B. E., Foley, R. J., Wood-Vasey, W. M., Challis, P., Stubbs, C., Kirshner, R. P., Aguilera, C., Becker, A. C., Blondin, S., Clocchiatti, A., Covarrubias, R., Damke, G., Davis, T. M., Filippenko, A. V., Ganeshalingam, M., Garg, A., Garnavich, P. M., Hicken, M., Jha, S. W., Krisciunas, K., Leibundgut, B., Li, W., Matheson, T., Miknaitis, G., Pignata, G., Prieto, J. L., Riess, A. G., Schmidt, B. P., Silverman, J. M., Smith, R. C., Sollerman, J., Spyromilio, J., Suntzeff, N. B., Tonry, J. L., Zenteno, A. Light Curves of 213 Type Ia Supernovae from the ESSENCE Survey. *The Astrophysical Journal Supplement Series*, 224:3, 5/2016.

Rameau, J., Nielsen, E. L., De Rosa, R. J., Blunt, S. C., Patience, J., Doyon, R., Graham, J. R., Lafrenière, D., Macintosh, B., Marchis, F., Bailey, V., Chilcote, J. K.,

Duchene, G., Esposito, T. M., Hung, L.-W., Konopacky, Q. M., Maire, J., Marois, C., Metchev, S., Perrin, M. D., Pueyo, L., Rajan, A., Savransky, D., Wang, J. J., Ward-Duong, K., Wolff, S. G., Ammons, S. M., Hibon, P., Ingraham, P., Kalas, P., Morzinski, K. M., Oppenheimer, R., Rantakyearö, F. T., Thomas, S. Constraints on the Architecture of the HD 95086 Planetary System with the Gemini Planet Imager. *The Astrophysical Journal*, 822:L29, 5/2016.

Gianninas, A., Curd, B., Fontaine, G., Brown, W. R., Kilic, M. Discovery of Three Pulsating, Mixed-atmosphere, Extremely Low-mass White Dwarf Precursors. *The Astrophysical Journal*, 822:L27, 5/2016.

Sand, D. J., Hsiao, E. Y., Banerjee, D. P. K., Marion, G. H., Diamond, T. R., Joshi, V., Parrent, J. T., Phillips, M. M., Stritzinger, M. D., Venkataraman, V. Post-maximum Near-infrared Spectra of SN 2014J: A Search for Interaction Signatures. *The Astrophysical Journal*, 822:L16, 5/2016.

Pike, R. E., Geballe, T. R., Burton, M. G., Chrysostomou, A. Highly Excited H_2 in Herbig-Haro 7: Formation Pumping in Shocked Molecular Gas?. *The Astrophysical Journal*, 822:82, 5/2016.

Narayan, G., Axelrod, T., Holberg, J. B., Matheson, T., Saha, A., Olszewski, E., Claver, J., Stubbs, C. W., Bohlin, R. C., Deustua, S., Rest, A. Toward a Network of Faint DA White Dwarfs as High-precision Spectrophotometric Standards. *The Astrophysical Journal*, 822:67, 5/2016.

Lacour, S., Biller, B., Cheetham, A., Greenbaum, A., Pearce, T., Marino, S., Tuthill, P., Pueyo, L., Mamajek, E. E., Girard, J. H., Sivaramakrishnan, A., Bonnefoy, M., Baraffe, I., Chauvin, G., Olofsson, J., Juhasz, A., Benisty, M., Pott, J.-U., Sicilia-Aguilar, A., Henning, T., Cardwell, A., Goodsell, S., Graham, J. R., Hibon, P., Ingraham, P., Konopacky, Q., Macintosh, B., Oppenheimer, R., Perrin, M., Rantakyrö, F., Sadakuni, N., Thomas, S. An M-dwarf star in the transition disk of Herbig HD 142527. Physical parameters and orbital elements. *Astronomy and Astrophysics*, 590:A90, 5/2016.

Piatti, A. E., Bastian, N. Extended main sequence turn-offs in low mass intermediate-age clusters. *Astronomy and Astrophysics*, 590:A50, 5/2016.

Grassitelli, L., Chené, A.-N., Sanyal, D., Langer, N., St-Louis, N., Bestenlehner, J. M., Fossati, L. Diagnostics of the unstable envelopes of Wolf-Rayet stars. *Astronomy and Astrophysics*, 590:A12, 5/2016.

Gutiérrez, C. P., González-Gaitán, S., Folatelli, G., Pignata, G., Anderson, J. P., Hamuy, M., Morrell, N., Stritzinger, M., Taubenberger, S., Bufano, F., Olivares E., F., Haislip, J. B., Reichart, D. E. Supernova 2010ev: A reddened high velocity gradient type Ia supernova. *Astronomy and Astrophysics*, 590:A5, 5/2016.

Rovero, A. C., Muriel, H., Donzelli, C., Pichel, A. The BL-Lacertae gamma-ray blazar PKS 1424+240 associated with a group of galaxies at z = 0.6010. *Astronomy and Astrophysics*, 589:A92, 5/2016.

Thomas, J., Ma, C.-P., McConnell, N. J., Greene, J. E., Blakeslee, J. P., Janish, R. A 17-billion-solar-mass black hole in a group galaxy with a diffuse core. *Nature*, 532:340-342, 4/2016.

Scharwächter, J., Combes, F., Salomé, P., Sun, M., Krips, M. The overmassive black hole in NGC 1277: new constraints from molecular gas kinematics. *Monthly Notices of the Royal Astronomical Society*, 457:4272-4284, 4/2016.

Prieto, M. A., Fernández-Ontiveros, J. A., Markoff, S., Espada, D., González-Martín, O. The central parsecs of M87: jet emission and an elusive accretion disc. *Monthly Notices of the Royal Astronomical Society*, 457:3801-3816, 4/2016.

Parrent, J. T., Howell, D. A., Fesen, R. A., Parker, S., Bianco, F. B., Dilday, B., Sand, D., Valenti, S., Vinkó, J., Berlind, P., Challis, P., Milisavljevic, D., Sanders, N., Marion, G. H., Wheeler, J. C., Brown, P., Calkins, M. L., Friesen, B., Kirshner, R., Pritchard, T., Quimby, R., Roming, P. Comparative analysis of SN 2012dn optical spectra: days -14 to +114. *Monthly Notices of the Royal Astronomical Society*, 457:3702-3723, 4/2016.

Andrews, J. E., Krafton, K. M., Clayton, G. C., Montiel, E., Wesson, R., Sugerman, B. E. K., Barlow, M. J., Matsuura, M., Drass, H. Early dust formation and a massive progenitor for SN 2011ja?. *Monthly Notices of the Royal Astronomical Society*, 457:3241-3253, 4/2016.

Deacon, N. R., Schlieder, J. E., Murphy, S. J. A nearby young M dwarf with a wide, possibly planetary-mass companion. *Monthly Notices of the Royal Astronomical Society*, 457:3191-3199, 4/2016.

Cerulo, P., Couch, W. J., Lidman, C., Demarco, R., Huertas-Company, M., Mei, S., Sánchez-Janssen, R., Barrientos, L. F., Muñoz, R. P. The accelerated build-up of the red sequence in high-redshift galaxy clusters. *Monthly Notices of the Royal Astronomical Society*, 457:2209-2235, 4/2016.

Jauzac, M., Richard, J., Limousin, M., Knowles, K., Mahler, G., Smith, G. P., Kneib, J.-P., Jullo, E., Natarajan, P., Ebeling, H., Atek, H., Clément, B., Eckert, D., Egami, E., Massey, R., Rexroth, M. Hubble Frontier Fields: predictions for the return of SN Refsdal with the MUSE and GMOS spectrographs. *Monthly Notices of the Royal Astronomical Society*, 457:2029-2042, 4/2016.

Wright, C. M., Do Duy, T., Lawson, W. Absorption at 11 μm in the interstellar medium and embedded sources: evidence for crystalline silicates. *Monthly Notices of the Royal Astronomical Society*, 457:1593-1625, 4/2016.

Kellogg, K., Metchev, S., Gagné, J., Faherty, J. The Nearest Isolated Member of the TW Hydrae Association is a Giant Planet Analog. *The Astrophysical Journal*, 821:L15, 4/2016.

Aller, K. M., Liu, M. C., Magnier, E. A., Best, W. M. J., Kotson, M. C., Burgett, W. S., Chambers, K. C., Hodapp, K. W., Flewelling, H., Kaiser, N., Metcalf, N., Tonry, J. L., Wainscoat, R. J., Waters, C. Brown Dwarfs in Young Moving Groups from Pan-STARRS1. I. AB Doradus. *The Astrophysical Journal*, 821:120, 4/2016.

Vayner, A., Wright, S. A., Do, T., Larkin, J. E., Armus, L., Gallagher, S. C. Providing Stringent Star Formation Rate Limits of z ˜ 2 QSO Host Galaxies at High Angular Resolution. *The Astrophysical Journal*, 821:64, 4/2016.

Fritz, T. K., Chatzopoulos, S., Gerhard, O., Gillessen, S., Genzel, R., Pfuhl, O., Tacchella, S., Eisenhauer, F., Ott, T. The Nuclear Cluster of the Milky Way: Total Mass and Luminosity. *The Astrophysical Journal*, 821:44, 4/2016.

Lin, D., Carrasco, E. R., Webb, N. A., Irwin, J. A., Dupke, R., Romanowsky, A. J., Ramirez-Ruiz, E., Strader, J., Homan, J., Barret, D., Godet, O. Discovery of the Candidate Off-nuclear Ultrasoft Hyper-luminous X-Ray Source 3XMM J141711.1+522541. *The Astrophysical Journal*, 821:25, 4/2016.

Honda, M., Kudo, T., Takatsuki, S., Inoue, A. K., Nakamoto, T., Fukagawa, M., Tamura, M., Terada, H., Takato, N. Water Ice at the Surface of the HD 100546 Disk. *The Astrophysical Journal*, 821:2, 4/2016.

Jensen-Clem, R., Millar-Blanchaer, M., Mawet, D., Graham, J. R., Wallace, J. K., Macintosh, B., Hinkley, S., Wiktorowicz, S. J., Perrin, M. D., Marley, M. S., Fitzgerald, M. P., Oppenheimer, R., Ammons, S. M., Rantakyrö, F. T., Marchis, F. Point Source Polarimetry with the Gemini Planet Imager: Sensitivity Characterization with T5.5 Dwarf Companion HD 19467 B. *The Astrophysical Journal*, 820:111, 4/2016.

Leethochawalit, N., Jones, T. A., Ellis, R. S., Stark, D. P., Richard, J., Zitrin, A., Auger, M. A Keck Adaptive Optics Survey of a Representative Sample of Gravitationally Lensed Star-forming Galaxies: High Spatial Resolution Studies of Kinematics and Metallicity Gradients. *The Astrophysical Journal*, 820:84, 4/2016.

Sanchez-Bermudez, J., Hummel, C. A., Tuthill, P., Alberdi, A., Schödel, R., Lacour, S., Stanke, T. Unveiling the near-infrared structure of the massive-young stellar object NGC 3603 IRS 9A* with sparse aperture masking and spectroastrometry. *Astronomy and Astrophysics*, 588:A117, 4/2016.

Magrini, L., Coccato, L., Stanghellini, L., Casasola, V., Galli, D. Metallicity gradients in local Universe galaxies: Time evolution and effects of radial migration. *Astronomy and Astrophysics*, 588:A91, 4/2016.

Snodgrass, C., Jehin, E., Manfroid, J., Opitom, C., Fitzsimmons, A., Tozzi, G. P., Faggi, S., Yang, B., Knight, M. M., Conn, B. C., Lister, T., Hainaut, O., Bramich, D. M., Lowry, S. C., Rozek, A., Tubiana, C., Guilbert-Lepoutre, A. Distant activity of 67P/Churyumov-Gerasimenko in 2014: Ground-based results during the Rosetta pre-landing phase. *Astronomy and Astrophysics*, 588:A80, 4/2016.

Garufi, A., Quanz, S. P., Schmid, H. M., Mulders, G. D., Avenhaus, H., Boccaletti, A., Ginski, C., Langlois, M., Stolker, T., Augereau, J.-C., Benisty, M., Lopez, B., Dominik, C., Gratton, R., Henning, T., Janson, M., Ménard, F., Meyer, M. R., Pinte, C., Sissa, E., Vigan, A., Zurlo, A., Bazzon, A., Buenzli, E., Bonnefoy, M., Brandner, W., Chauvin, G., Cheetham, A., Cudel, M., Desidera, S., Feldt, M., Galicher, R., Kasper, M., Lagrange, A.-M., Lannier, J., Maire, A. L., Mesa, D., Mouillet, D., Peretti, S., Perrot, C., Salter, G., Wildi, F. The SPHERE view of the planet-forming disk around HD 100546. *Astronomy and Astrophysics*, 588:A8, 4/2016.

Schnorr-Müller, A., Storchi-Bergmann, T., Robinson, A., Lena, D., Nagar, N. M. Feeding and feedback in NGC 3081. *Monthly Notices of the Royal Astronomical Society*, 457:972-985, 3/2016.

May, D., Steiner, J. E., Ricci, T. V., Menezes, R. B., Andrade, I. S. Digging process in NGC 6951: the molecular disc bumped by the jet. *Monthly Notices of the Royal Astronomical Society*, 457:949-970, 3/2016.

Wylezalek, D., Zakamska, N. L., Liu, G., Obied, G. Towards a comprehensive picture of powerful quasars, their host galaxies and quasar winds at z ˜ 0.5. *Monthly Notices of the Royal Astronomical Society*, 457:745-763, 3/2016.

Rogerson, J. A., Hall, P. B., Rodríguez Hidalgo, P., Pirkola, P., Brandt, W. N., Filiz Ak, N. Multi-epoch observations of extremely high-velocity emergent broad absorption. *Monthly Notices of the Royal Astronomical Society*, 457:405-420, 3/2016.

Balogh, M. L., McGee, S. L., Mok, A., Muzzin, A., van der Burg, R. F. J., Bower, R. G., Finoguenov, A., Hoekstra, H., Lidman, C., Mulchaey, J. S., Noble, A., Parker, L. C., Tanaka, M., Wilman, D. J., Webb, T., Wilson, G., Yee, H. K. C. Evidence for a change in the dominant satellite galaxy quenching mechanism at z = 1. *Monthly Notices of the Royal Astronomical Society*, 456:4364-4376, 3/2016.

Karouzos, M., Woo, J.-H., Bae, H.-J. Unraveling the Complex Structure of AGN-driven Outflows. I. Kinematics and Sizes. *The Astrophysical Journal*, 819:148, 3/2016.

Allers, K. N., Gallimore, J. F., Liu, M. C., Dupuy, T. J. The Radial and Rotational Velocities of PSO J318.5338-22.8603, a Newly Confirmed Planetary-mass Member of the β Pictoris Moving Group. *The Astrophysical Journal*, 819:133, 3/2016.

Assef, R. J., Walton, D. J., Brightman, M., Stern, D., Alexander, D., Bauer, F., Blain, A. W., Diaz-Santos, T., Eisenhardt, P. R. M., Finkelstein, S. L., Hickox, R. C., Tsai, C.-W., Wu, J. W. Hot Dust Obscured Galaxies with Excess Blue Light: Dual AGN or Single AGN Under Extreme Conditions?. *The Astrophysical Journal*, 819:111, 3/2016.

Levan, A. J., Tanvir, N. R., Brown, G. C., Metzger, B. D., Page, K. L., Cenko, S. B., O'Brien, P. T., Lyman, J. D., Wiersema, K., Stanway, E. R., Fruchter, A. S., Perley, D. A., Bloom, J. S. Late Time Multi-wavelength Observations of Swift J1644+5734: A Luminous Optical/IR Bump and Quiescent X-Ray Emission. *The Astrophysical Journal*, 819:51, 3/2016.

Madrid, J. P., Donzelli, C. J. The Abell 85 BCG: A Nucleated, Coreless Galaxy. *The Astrophysical Journal*, 819:50, 3/2016.

Arcavi, I., Wolf, W. M., Howell, D. A., Bildsten, L., Leloudas, G., Hardin, D., Prajs, S., Perley, D. A., Svirski, G., Gal-Yam, A., Katz, B., McCully, C., Cenko, S. B., Lidman, C., Sullivan, M., Valenti, S., Astier, P., Balland, C., Carlberg, R. G., Conley, A., Fouchez, D., Guy, J., Pain, R., Palanque-Delabrouille, N., Perrett, K., Pritchet, C. J., Regnault, N., Rich, J., Ruhlmann-Kleider, V. Rapidly Rising Transients in the Supernova—Superluminous Supernova Gap. *The Astrophysical Journal*, 819:35, 3/2016.

Opitz, D., Tinney, C. G., Faherty, J. K., Sweet, S., Gelino, C. R., Kirkpatrick, J. D. Searching for Binary Y Dwarfs with the Gemini Multi-conjugate Adaptive Optics System (GeMS). *The Astrophysical Journal*, 819:17, 3/2016.

Yan, T., Stocke, J. T., Darling, J., Momjian, E., Sharma, S., Kanekar, N. Invisible Active Galactic Nuclei. II. Radio Morphologies and Five New H i 21cm Absorption Line Detectors. *The Astronomical Journal*, 151:74, 3/2016.

Díaz Tello, J., Donzelli, C., Padilla, N., Akiyama, M., Fujishiro, N., Yoshikawa, T., Hanami, H. Star formation activity in Balmer break galaxies at z< 1.5. *Astronomy and Astrophysics*, 587:A136, 3/2016.

Khalafinejad, S., Maaskant, K. M., Mariñas, N., Tielens, A. G. G. M. Large dust gaps in the transitional disks of HD 100453 and HD 34282. Connecting the gap size to the spectral energy distribution and mid-infrared imaging. *Astronomy and Astrophysics*, 587:A62, 3/2016.

Maire, A.-L., Bonnefoy, M., Ginski, C., Vigan, A., Messina, S., Mesa, D., Galicher, R., Gratton, R., Desidera, S., Kopytova, T. G., Millward, M., Thalmann, C., Claudi, R. U., Ehrenreich, D., Zurlo, A., Chauvin, G., Antichi, J., Baruffolo, A., Bazzon, A., Beuzit, J.-L., Blanchard, P., Boccaletti, A., de Boer, J., Carle, M., Cascone, E., Costille, A., De Caprio, V., Delboulbé, A., Dohlen, K., Dominik, C., Feldt, M., Fusco, T., Girard, J. H., Giro, E., Gisler, D., Gluck, L., Gry, C., Henning, T., Hubin, N., Hugot, E., Jaquet, M., Kasper, M., Lagrange, A.-M., Langlois, M., Le Mignant, D., Llored, M., Madec, F., Martinez, P., Mawet, D., Milli, J., Möller-Nilsson, O., Mouillet, D., Moulin, T., Moutou, C., Origné, A., Pavlov, A., Petit, C., Pragt, J., Puget, P., Ramos, J., Rochat, S., Roelfsema, R., Salasnich, B., Sauvage, J.-F., Schmid, H. M., Turatto, M., Udry, S., Vakili, F., Wahhaj, Z., Weber, L., Wildi, F. First light of the VLT planet finder SPHERE. II. The physical properties and the architecture of the young systems PZ Telescopii and HD 1160 revisited. *Astronomy and Astrophysics*, 587:A56, 3/2016.

Santos, J. F. C., Jr., Roman-Lopes, A., Carrasco, E. R., Maia, F. F. S., Neichel, B. GeMs/GSAOI observations of La Serena 94: an old and far open cluster inside the solar circle. *Monthly Notices of the Royal Astronomical Society*, 456:2126-2139, 2/2016.

Loubser, S. I., Babul, A., Hoekstra, H., Mahdavi, A., Donahue, M., Bildfell, C., Voit, G. M. The regulation of star formation in cool-core clusters: imprints on the stellar populations of brightest cluster galaxies. *Monthly Notices of the Royal Astronomical Society*, 456:1565-1578, 2/2016.

Janz, J., Norris, M. A., Forbes, D. A., Huxor, A., Romanowsky, A. J., Frank, M. J., Escudero, C. G., Faifer, F. R., Forte, J. C., Kannappan, S. J., Maraston, C., Brodie, J. P., Strader, J., Thompson, B. R. The AIMSS Project - III. The stellar populations of compact stellar systems. *Monthly Notices of the Royal Astronomical Society*, 456:617-632, 2/2016.

Johnston, H. M., Soria, R., Gibson, J. The nature of the companion star in Circinus X-1. *Monthly Notices of the Royal Astronomical Society*, 456:347-355, 2/2016.

Bassa, C. G., Antoniadis, J., Camilo, F., Cognard, I., Koester, D., Kramer, M., Ransom, S. R., Stappers, B. W. Cool white dwarf companions to four millisecond pulsars. *Monthly Notices of the Royal Astronomical Society*, 455:3806-3813, 2/2016.

Smith, N., Andrews, J. E., Mauerhan, J. C., Zheng, W., Filippenko, A. V., Graham, M. L., Milne, P. The Persistent Eruption of UGC 2773-OT: finally, a decade-long extragalactic Eta Carinae analogue. *Monthly Notices of the Royal Astronomical Society*, 455:3546-3560, 2/2016.

Wolff, S. G., Perrin, M., Millar-Blanchaer, M. A., Nielsen, E. L., Wang, J., Cardwell, A., Chilcote, J., Dong, R., Draper, Z. H., Duchêne, G., Fitzgerald, M. P., Goodsell, S. J., Grady, C. A., Graham, J. R., Greenbaum, A. Z., Hartung, M., Hibon, P., Hines, D. C.,

Hung, L.-W., Kalas, P., Macintosh, B., Marchis, F., Marois, C., Pueyo, L., Rantakyrö, F. T., Schneider, G., Sivaramakrishnan, A., Wiktorowicz, S. J. The PDS 66 Circumstellar Disk as Seen in Polarized Light with the Gemini Planet Imager. *The Astrophysical Journal*, 818:L15, 2/2016.

Liu, Y., Peng, E. W., Blakeslee, J., Côté, P., Ferrarese, L., Jordán, A., Puzia, T. H., Toloba, E., Zhang, H.-X. Evidence for the Rapid Formation of Low-mass Early-type Galaxies in Dense Environments. *The Astrophysical Journal*, 818:179, 2/2016.

Mazoyer, J., Boccaletti, A., Choquet, É., Perrin, M. D., Pueyo, L., Augereau, J.-C., Lagrange, A.-M., Debes, J., Wolff, S. G. A Symmetric Inner Cavity in the HD 141569A Circumstellar Disk. *The Astrophysical Journal*, 818:150, 2/2016.

Davidge, T. J. The Compact Star-forming Complex at the Heart of NGC 253. *The Astrophysical Journal*, 818:142, 2/2016.

Endl, M., Brugamyer, E. J., Cochran, W. D., MacQueen, P. J., Robertson, P., Meschiari, S., Ramirez, I., Shetrone, M., Gullikson, K., Johnson, M. C., Wittenmyer, R., Horner, J., Ciardi, D. R., Horch, E., Simon, A. E., Howell, S. B., Everett, M., Caldwell, C., Castanheira, B. G. Two New Long-period Giant Planets from the McDonald Observatory Planet Search and Two Stars with Long-period Radial Velocity Signals Related to Stellar Activity Cycles. *The Astrophysical Journal*, 818:34, 2/2016.

Khazov, D., Yaron, O., Gal-Yam, A., Manulis, I., Rubin, A., Kulkarni, S. R., Arcavi, I., Kasliwal, M. M., Ofek, E. O., Cao, Y., Perley, D., Sollerman, J., Horesh, A., Sullivan, M., Filippenko, A. V., Nugent, P. E., Howell, D. A., Cenko, S. B., Silverman, J. M., Ebeling, H., Taddia, F., Johansson, J., Laher, R. R., Surace, J., Rebbapragada, U. D., Wozniak, P. R., Matheson, T. Flash Spectroscopy: Emission Lines from the Ionized Circumstellar Material around <10-day-old Type II Supernovae. *The Astrophysical Journal*, 818:3, 2/2016.

Seok, J. Y., Li, A. Dust and Polycyclic Aromatic Hydrocarbon in the Pre-transitional Disk around HD 169142. *The Astrophysical Journal*, 818:2, 2/2016.

Menezes, R. B., Steiner, J. E., da Silva, P. The Off-centered Seyfert-like Compact Emission in the Nuclear Region of NGC 3621. *The Astrophysical Journal*, 817:150, 2/2016.

Sakon, I., Sako, S., Onaka, T., Nozawa, T., Kimura, Y., Fujiyoshi, T., Shimonishi, T., Usui, F., Takahashi, H., Ohsawa, R., Arai, A., Uemura, M., Nagayama, T., Koo, B.-C., Kozasa, T. Concurrent Formation of Carbon and Silicate Dust in Nova V1280 Sco. *The Astrophysical Journal*, 817:145, 2/2016.

Blanchard, P. K., Berger, E., Fong, W.-f. The Offset and Host Light Distributions of Long Gamma-Ray Bursts: A New View From HST Observations of Swift Bursts. *The Astrophysical Journal*, 817:144, 2/2016.

Boley, P. A., Kraus, S., de Wit, W.-J., Linz, H., van Boekel, R., Henning, T., Lacour, S., Monnier, J. D., Stecklum, B., Tuthill, P. G. A multi-wavelength interferometric study of the massive young stellar object IRAS 13481-6124. *Astronomy and Astrophysics*, 586:A78, 2/2016.

Massari, D., Fiorentino, G., McConnachie, A., Bono, G., Dall'Ora, M., Ferraro, I., Iannicola, G., Stetson, P. B., Turri, P., Tolstoy, E. GeMS MCAO observations of the Galactic globular cluster NGC 2808: the absolute age. *Astronomy and Astrophysics*, 586:A51, 2/2016.

Bannister, K. W., Stevens, J., Tuntsov, A. V., Walker, M. A., Johnston, S., Reynolds, C., Bignall, H. Real-time detection of an extreme scattering event: Constraints on Galactic plasma lenses. *Science*, 351:354-356, 1/2016.

Reynaldi, V., Feinstein, C. The fingerprints of photoionization and shock-ionization in two CSS sources. *Monthly Notices of the Royal Astronomical Society*, 455:2242-2252, 1/2016.

White, M. C., Bicknell, G. V., Sutherland, R. S., Salmeron, R., McGregor, P. J. Turbulent mixing layers in supersonic protostellar outflows, with application to DG Tauri. *Monthly Notices of the Royal Astronomical Society*, 455:2042-2057, 1/2016.

Hoyer, S., López-Morales, M., Rojo, P., Minniti, D., Adams, E. R. TraMoS - IV. Discarding the Quick Orbital Decay Hypothesis for OGLE-TR-113b. *Monthly Notices of the Royal Astronomical Society*, 455:1334-1340, 1/2016.

Gałan, C., Mikołajewska, J., Hinkle, K. H., Joyce, R. R. Chemical abundance analysis of symbiotic giants - III. Metallicity and CNO abundance patterns in 24 southern systems. *Monthly Notices of the Royal Astronomical Society*, 455:1282-1293, 1/2016.

Chiu, I., Mohr, J., McDonald, M., Bocquet, S., Ashby, M. L. N., Bayliss, M., Benson, B. A., Bleem, L. E., Brodwin, M., Desai, S., Dietrich, J. P., Forman, W. R., Gangkofner, C., Gonzalez, A. H., Hennig, C., Liu, J., Reichardt, C. L., Saro, A., Stalder, B., Stanford, S. A., Song, J., Schrabback, T., Šuhada, R., Strazzullo, V., Zenteno, A. Baryon content of massive galaxy clusters at $0.57 < z < 1.33$. *Monthly Notices of the Royal Astronomical Society*, 455:258-275, 1/2016.

de Pater, I., Laver, C., Davies, A. G., de Kleer, K., Williams, D. A., Howell, R. R., Rathbun, J. A., Spencer, J. R. Io: Eruptions at Pillan, and the time evolution of Pele and Pillan from 1996 to 2015. *Icarus*, 264:198-212, 1/2016.

Ye, Q.-Z., Hui, M.-T., Brown, P. G., Campbell-Brown, M. D., Pokorný, P., Wiegert, P. A., Gao, X. When comets get old: A synthesis of comet and meteor observations of the low activity comet 209P/LINEAR. *Icarus*, 264:48-61, 1/2016.

Perley, D. A., Krühler, T., Schulze, S., de Ugarte Postigo, A., Hjorth, J., Berger, E., Cenko, S. B., Chary, R., Cucchiara, A., Ellis, R., Fong, W., Fynbo, J. P. U., Gorosabel, J., Greiner, J., Jakobsson, P., Kim, S., Laskar, T., Levan, A. J., Michałowski, M. J., Milvang-Jensen, B., Tanvir, N. R., Thöne, C. C., Wiersema, K. The Swift Gamma-Ray Burst Host Galaxy Legacy Survey. I. Sample Selection and Redshift Distribution. *The Astrophysical Journal*, 817:7, 1/2016.

Walsh, J. L., van den Bosch, R. C. E., Gebhardt, K., Yıldırım, A., Richstone, D. O., Gültekin, K., Husemann, B. A 5×10^9 Msun Black Hole in NGC 1277 from Adaptive Optics Spectroscopy. *The Astrophysical Journal*, 817:2, 1/2016.

Castro, P. J., Gizis, J. E. Discovery of an L4 beta Candidate Member of Argus in the Planetary Mass Regime: Wise J231921.92+764544.4. *The Astrophysical Journal*, 816:78, 1/2016.

Noble, A. G., Webb, T. M. A., Yee, H. K. C., Muzzin, A., Wilson, G., van der Burg, R. F. J., Balogh, M. L., Shupe, D. L. The Phase Space of z˜1.2 SpARCS Clusters: Using Herschel to Probe Dust Temperature as a Function of Environment and Accretion History. *The Astrophysical Journal*, 816:48, 1/2016.

Appendix D. Science Programs 2015B and 2016A

D.1 2015B Science Programs – Gemini North

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GN-2015B-C-1	Tominaga	Subaru	GMOS-N	Spectroscopy of host galaxies of supernovae with shock breakout detection	10.00 HR
C	GN-2015B-C-2	Morokuma	Subaru	GMOS-N	High-z Low-Mass Active BHs Selected via Hour-Scale Variability	10.00 HR
C	GN-2015B-C-3	Griffith	US	GMOS-N	Elementary Abundances of Planetary Systems	1.00 NIGHT
1	GN-2015B-LP-1	Fraser	LP	GMOS-N, NIRI	COL-OSSOS: COLours for the Outer Solar System Object Survey (North)	50.00 HR
1	GN-2015B-LP-2	Kasliwal	LP	GMOS-N	Rapid Spectroscopy of Elusive Transients and Young Supernovae	23.10 HR
1	GN-2015B-LP-3	Huitson	LP	GMOS-N	The First Survey Dedicated to the Detection and Characterization of Clouds in Exoplanet Atmospheres	6.30 HR
1	GN-2015B-LP-4	Balogh	LP	GMOS-N	The GOGREEN Survey of dense galaxy environments at 1<z<1.5 (North)	19.50 HR
2	GN-2015B-LP-5	Crossfield	LP	DSSI,GNIRS	Validating K2?s Habitable and Rocky Planets with AO Imaging	20.00 HR
2	GN-2015B-LP-6	Huitson	LP	GMOS-N	The First Survey Dedicated to the Detection and Characterization of Clouds in Exoplanet Atmospheres	17.50 HR
2	GN-2015B-LP-7	Shen	LP	GNIRS	A GNIRS Near-IR Spectroscopic Survey of z>5.7 Quasars	35.30 HR
1	GN-2015B-Q-1	A. Almeida	BR	GRACES	Radial velocity confirmation of an exoplanet candidate around an evolved compact binary	4.80 HR
1	GN-2015B-Q-2	Arias	AR	GNIRS	Disentangling the population of evolved massive stars in the galaxy M33	8.60 HR
1	GN-2015B-Q-3	Bresolin	UH	GMOS-N	The extreme environments of thermonuclear supernovae	6.00 HR
1	GN-2015B-Q-4	Chambers	UH	GMOS-N, GNIRS	Pan-STARRS Survey for Counterparts to aLIGO GW events	4.00 HR
1	GN-2015B-Q-5	Chapman	CA	GNIRS	The origin of multiplicity in sub-mm sources: physical associations or line-of-sight projections?	22.00 HR
1	GN-2015B-Q-6	Dawson	US	GMOS-N	Two Ideal Dark Matter Colliders	9.00 HR
1	GN-2015B-Q-7	Diamond	US	GNIRS	Late-time near-infrared spectroscopy of SN 2014J	2.10 HR
1	GN-2015B-Q-8	Fesen	US	NIRI	Near-infrared identification of the young pulsar J0205+6449	1.50 HR
1	GN-2015B-Q-9	Foley	US	GMOS-N	Understanding the Progenitor Systems, Explosion Mechanisms, and Cosmological Utility of Type Ia Supernovae (North)	4.00 HR
1	GN-2015B-Q-10	Foley	BR/US/AU	GMOS-N	DES Supernova Cosmology (North)	21.60 HR
1	GN-2015B-Q-11	Freeman	AU	GRACES	Were globular clusters born in dark matter sub-halos?	5.40 HR
1	GN-2015B-Q-12	Gladders	US	GMOS-N	Time delays for the sextuply-lensed quasar SDSS J2222+2745 from GMOS	3.20 HR
1	GN-2015B-Q-13	González	AR	GMOS-N	Exploring the faint galaxy content and the globular cluster systems of the Pegasus I Group.	3.30 HR
1	GN-2015B-Q-14	Im	KR	NIRI	NIR Imaging of A Quasar Candidate at z ~ 7	2.40 HR
1	GN-2015B-Q-15	Lee	KR	GMOS-N	An Integral Field Unit Spectroscopy of Local E+A Galaxies	14.10 HR
1	GN-2015B-Q-16	Lee	KR	NIRI	Precise Mass Measurement of Circumstellar Shells around Luminous Blue Variables	2.50 HR

1	GN-2015B-Q-17	Mackey	AU	GMOS-N	A Search for Intergalactic Globular Clusters in the Local Group	2.60 HR
1	GN-2015B-Q-18	Meech	UH	GMOS-N	Onset of 238P/Read Activity	2.60 HR
1	GN-2015B-Q-19	Meech	UH	GMOS-N	Testing Solar System Formation Models	4.80 HR
1	GN-2015B-Q-20	Montet	US	DSSI	Fundamental Parameters of Pre-Main Sequence M Dwarfs	14.10 HR
1	GN-2015B-Q-21	Moskovitz	US	GMOS-N, GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.04 HR
1	GN-2015B-Q-22	Reipurth	UH	GNIRS,NIRI	Properties of Newborn Triple and Quadruplel Systems	11.50 HR
1	GN-2015B-Q-23	Rodney	US	GMOS-N	The Next Frontier: High-Redshift Supernovae in the HST Frontier Fields (North)	5.00 HR
1	GN-2015B-Q-24	Saha	US	GMOS-N	Establishing a Network of DA White Dwarf SED Standards	8.50 HR
1	GN-2015B-Q-25	Scholz	CA	NIRI	Rapid Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (North)	5.00 HR
1	GN-2015B-Q-26	Sharon	US	GMOS-N	“Resolving the Star Formation in Distant Galaxies” - supporting ground-based spectroscopy for a large HST program	13.50 HR
1	GN-2015B-Q-27	Sharon	US	GMOS-N	Multi Object Spectroscopy of the field of SDSSJ2222+2745: A cluster-lensed sextuple quasar	4.50 HR
1	GN-2015B-Q-28	Skemer	US	GNIRS	The First Spectrum of the Coolest Brown Dwarf	29.00 HR
1	GN-2015B-Q-29	Storchi-Bergmann	BR	NIFS	NIFS survey of feeding and feedback processes in nearby Active Galaxies	15.00 HR
1	GN-2015B-Q-30	Tominaga	Subaru	GMOS-N	Detection and Follow-up Observations of Type II Plateau Supernovae	7.50 HR
1	GN-2015B-Q-31	van Kerkwijk	CA	GMOS-N, GNIRS,NIRI	SN2014J at very late phases	16.00 HR
1	GN-2015B-Q-32	van Velzen	US	GMOS-N	Reverberation mapping of stellar tidal disruption flares	5.00 HR
1	GN-2015B-Q-33	Williams	UH	GRACES	Accretion & wind properties of protoplanetary disks in σ Orionis	14.00 HR
1	GN-2015B-Q-34	Wolf	AU	NIRI	Measuring star formation in red spirals with Paschen-Alpha	5.00 HR
2	GN-2015B-Q-35	Alexandroff	US	NIFS	Quasar feedback at the peak of the galaxy formation epoch	9.00 HR
2	GN-2015B-Q-36	Baldwin	AU	GNIRS	A comparison of spectroscopic and dynamical IMF determinations in the near-infrared	12.50 HR
2	GN-2015B-Q-37	Beck	J:AU/US	NIFS	Characterizing "Typical" Jets from Young Stars	15.00 HR
2	GN-2015B-Q-38	Cenko	US	GMOS-N	The Demographics of Tidal Disruption Flares (North)	3.00 HR
2	GN-2015B-Q-39	Cidale	AR	NIRI	On the structure and kinematics of the nebulae around the star MWC 137	2.80 HR
2	GN-2015B-Q-40	Daemgen	CA	NIFS	Protoplanetary disk lifetimes revisited - The frequency of disks around single stars and binary components as a function of age	6.00 HR
2	GN-2015B-Q-41	Drahus	US	GMOS-N	Disruption of the Active Asteroid P/2012 F5 (Gibbs)	7.00 HR
2	GN-2015B-Q-42	Ebeling	UH	GMOS-N	GMOS imaging of massive galaxy clusters at z>0.5	13.00 HR
2	GN-2015B-Q-43	Esplin	US	GNIRS	Searching for the Bottom of the IMF	10.30 HR
2	GN-2015B-Q-44	Esteves	CA	NIRI	Cloudy with a chance of storms: breaking the degeneracy between reflection and heat circulation in Kepler exoplanet atmospheres with NIRI	6.00 HR
2	GN-2015B-Q-45	Ferrero	AR	NIRI	Searching for the HH 31 counter-jet in the IRAS 04248+2612	4.00 HR
2	GN-2015B-Q-46	Fu	US	GNIRS	How Massive Galaxies Get Cold Gas: The Circum-Galactic Medium of Dusty Starburst Galaxies at z ~ 2	12.60 HR

2	GN-2015B-Q-47	Glazebrook	AU/CA	GMOS-N	Observational testing of a new model of angular momentum as a fundamental driver of clumpy disks. (North)	4.38 HR
2	GN-2015B-Q-48	Grunhut	CA	GNIRS	Characterizing the magnetosphere of the new magnetic Bp star HD 23478 via IR emission features	3.40 HR
2	GN-2015B-Q-49	Horch	US	Dssi	Understanding the Metal-Poor Mass-Luminosity Relation	4.20 HR
2	GN-2015B-Q-50	Jayawardhana	CA	GMOS-N	Measuring the Alkali line-profiles in the transmission spectrum of XO-2b	7.00 HR
2	GN-2015B-Q-51	Kim	KR	GNIRS	Black hole mass versus stellar velocity dispersion relation of red AGNs	11.00 HR
2	GN-2015B-Q-52	Kim	KR	GNIRS	Near-Infared Spectroscopy of Massive Young Stellar Objects with Remarkable Bipolar Outflow in Infrared Dark Cloud G53.2	4.00 HR
2	GN-2015B-Q-53	Knight	US	GNIRS,NIRI	Multi-scale investigation of the coma of comet 67P/Churyumov-Gerasimenko: Combined Gemini and Rosetta study of activity	13.40 HR
2	GN-2015B-Q-54	Liu	AU	GRACES	Chemical signatures of planet formation in small planets hosts	5.60 HR
2	GN-2015B-Q-55	Liu	US	GMOS-N	IFU mapping of the most energetic BAL quasar outflows: C IV absorption	10.80 HR
2	GN-2015B-Q-56	Luna	AR	GMOS-N	Hydrogen burning symbiotics in M31	5.10 HR
2	GN-2015B-Q-57	Magnier	UH	GNIRS	Rare Brown Dwarfs in the Solar Neighborhood from Pan-STARRS 1	17.00 HR
2	GN-2015B-Q-58	Mast	BR/US	NIFS	Integral Field Spectroscopy of Arcs - Unveiling the hundreds pc of star-forming galaxies at redshift ~0.7 to 2.5	8.00 HR
2	GN-2015B-Q-59	McConnell	CA	GMOS-N	The Black Hole Population of the Most Massive Nearby Galaxies	11.80 HR
2	GN-2015B-Q-60	Milisavljevic	US	GMOS-N, GNIRS	The Unprecedented Supernova Metamorphosis of SN 2014C	3.30 HR
2	GN-2015B-Q-61	Moskovitz	US	GMOS-N, GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.04 HR
2	GN-2015B-Q-62	Méndez	UH/AR	GRACES	A search for spectroscopic binary central stars of planetary nebulae	15.00 HR
2	GN-2015B-Q-63	Reggiani	BR	GRACES	Distinct halo populations revealed through precise chemical abundances of very metal-poor stars	12.00 HR
2	GN-2015B-Q-64	Scholz	CA	NIRI	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (North)	13.13 HR
2	GN-2015B-Q-65	Sengupta	KR	GMOS-N	Dark matter content of TDGs -- kinematics of Arp 202 TDG.	3.60 HR
2	GN-2015B-Q-66	Spina	BR	GRACES	Unveiling chemical signatures of triggered star formation in the Orion B NGC2068/71 clusters	10.50 HR
2	GN-2015B-Q-67	Szkody	US	GMOS-N	Do white dwarfs in cataclysmic varibales grow in mass?	13.50 HR
2	GN-2015B-Q-68	Tucker	AU/US	GMOS-N	Catching Supernovae in the Act with KEGS (Kepler Extra-Galactic Survey) (North)	3.10 HR
2	GN-2015B-Q-69	Valenti	US	GMOS-N	Nebular observtions of SNe type II (North)	6.00 HR
3	GN-2015B-Q-70	Berg	US	GMOS-N	Ultra Exteme Star-Forming Galaxies: A Window On Low Metallicity Star Formation at High Redshift (North)	5.20 HR
3	GN-2015B-Q-71	Bowler	US	GRACES	Reconnaissance of Young M Dwarfs: Confirming the Elusive Majority of Nearby Moving Groups	18.00 HR
3	GN-2015B-Q-72	Burningham	US	GNIRS	Characterising a very fast moving T dwarf in the Galactic Plane	2.10 HR
3	GN-2015B-Q-73	Chiang	US/BR/CL	GMOS-N	Mapping out the Densest Structures in the COSMOS Field at z~2-3 (North)	20.36 HR

3	GN-2015B-Q-74	Cidale	AR	GNIRS	Search for molecular emission bands in the circumstellar environment of symbiotic stars	1.60 HR
3	GN-2015B-Q-75	Gagné	CA	GRACES	Identification and characterization of very low-mass and brown dwarf candidate members of nearby young associations	17.30 HR
3	GN-2015B-Q-76	Henry	US	DSSI	Searching for Companions to Nearby Stars on Solar System Scales	40.00 HR
3	GN-2015B-Q-77	Jeon	KR	GNIRS	Near Infrared Spectroscopic Observation of Quasars at 5<z<6	5.20 HR
3	GN-2015B-Q-78	Jha	US	GMOS-N	Spectroscopy of Type Iax Supernovae (North)	5.00 HR
3	GN-2015B-Q-79	Kellogg	CA	GNIRS	Determining the Cause of Dustiness in New Peculiar L and T Dwarfs	14.90 HR
3	GN-2015B-Q-80	LaMassa	US	GNIRS	Unveiling Obscured Supermassive Black Hole Growth with Infrared Spectroscopy	12.00 HR
3	GN-2015B-Q-81	Marino	AU	GRACES	The Milky Way globular cluster NGC6934: a remnant of a cannibalized dwarf like Omega Centauri?	6.70 HR
3	GN-2015B-Q-82	Meyer	CA	NIFS	A NIFS near-infrared probe of the variable IMF in nearby spiral bulges	9.60 HR
3	GN-2015B-Q-83	Méndez	UH	GRACES	A search for spectroscopic binary central stars of planetary nebulae	25.00 HR
3	GN-2015B-Q-84	Orosz	US	GMOS-N	An optical search for black holes and neutron stars in the Kepler field	17.50 HR
3	GN-2015B-Q-85	Rich	US/AU	GMOS-N	Quenching Caught in the Act: Measuring Feedback in Shocked Post-Starburst Galaxies	5.30 HR
3	GN-2015B-Q-86	Schlaufman	US	GMOS-N	An All-Sky Search for the Brightest Metal-Poor Stars (North)	26.50 HR
3	GN-2015B-Q-87	Stockton	UH	GMOS-N	Large Scale LINER Emission around Low-Excitation Radio Galaxies	8.00 HR
3	GN-2015B-Q-88	Taak	KR	NIRI	K Band Imaging of a Strong Gravitational Lens System Candidate at z = 1.60	2.20 HR
3	GN-2015B-Q-89	Torres	AR	GNIRS	Evolutionary state and circumstellar environment of evolved massive stars	2.10 HR
3	GN-2015B-Q-90	Venn	CA	GRACES	The chemistry of accreted stars in the Milky Way outer halo	4.50 HR
3	GN-2015B-Q-91	Winkler	US	GMOS-N	Supernova Remnants in the Most Fertile Galaxy: NGC 6946	8.00 HR
3	GN-2015B-Q-92	Woo	KR	GMOS-N	AGN feedback in action: extreme gas outflows in type 2 AGNs	5.00 HR
4	GN-2015B-Q-93	Asplund	AU	GRACES	The most metal-rich stars: probing exoplanets, stellar nucleosynthesis, Galactic archaeology, and galaxy evolution	15.00 HR
4	GN-2015B-Q-94	Kedziora-Chudczer	AU	GNIRS	Mapping and Characterization of Jovian Aurora in near infrared bands	5.00 HR
4	GN-2015B-Q-95	Manset	CA	GRACES	Unveiling the Nature of FS CMa Type Stars	12.50 HR
4	GN-2015B-Q-96	Yong	AU	GRACES	Unveiling the origin of the young [alpha/Fe]-rich stars	6.70 HR

D.2 2015B Science Programs – Gemini South

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GS-2015B-C-1	Kannappan	US	GMOS-S	Resolved Spectroscopy of a Local Volume: The RESOLVE Survey in Stripe 82	40.00 HR
1	GS-2015B-LP-1	Balogh	LP	GMOS-S	The GOGREEN Survey of dense galaxy environments at 1<z<1.5 (South)	68.90 HR
1	GS-2015B-LP-2	Fritz	LP	GMOS-S, GSAOI	Probing the dark halo of the Milky Way with GeMS/GSAOI	27.40 HR
1	GS-2015B-LP-7	Kasliwal	LP	GMOS-S	Rapid Spectroscopy of Elusive Transients and Young Supernovae	4.00 HR
1	GS-2015B-LP-3	Masiero	LP	GMOS-S	Follow up of newly discovered Near-Earth objects from the NEOWISE survey	8.00 HR
2	GS-2015B-LP-5	Buckley-Geer	LP	GMOS-S	Spectroscopic Confirmation and AO imaging Follow-Up of Dark Energy Survey Strong Lensing Systems and Spectra for Photometric Redshift Calibration	80.00 HR
2	GS-2015B-LP-6	Chen	LP	GPI	Characterizing Dusty Debris in Exoplanetary Systems	28.00 HR
1	GS-2015B-Q-2	Burgasser	US	GMOS-S	Mass Measurements Across the Hydrogen Burning Limit: Astrometric Orbits for Spectral Binaries	9.20 HR
1	GS-2015B-Q-3	Cieza	CL	GPI	GPI Characterization of the Benchmark Brown Dwarf HD4747 B	2.60 HR
1	GS-2015B-Q-4	Diaz/Diaz	AR	Flamingos 2, GMOS-S	The Origin of CIV absorptions at z > 3	5.00 HR
1	GS-2015B-Q-5	Folatelli	AR	Flamingos 2	Late-Time Near-Infrared Spectroscopy of Type Ia SN 2015F	3.00 HR
1	GS-2015B-Q-6	Foley	US	GMOS-S	Understanding the Progenitor Systems, Explosion Mechanisms, and Cosmological Utility of Type Ia Supernovae (South)	4.00 HR
1	GS-2015B-Q-7	Foley	AU/BR/US	GMOS-S	DES Supernova Cosmology (South)	21.60 HR
1	GS-2015B-Q-8	Galbany	CL	GMOS-S	New Approaches to Supernova Standardization for Cosmology	10.00 HR
1	GS-2015B-Q-9	Graham	CA/US	GPI	Astrometry of beta Pic b with GPI	3.70 HR
1	GS-2015B-Q-10	Gromadzki	CL	GSAOI	Trigonometric parallax of ancient T dwarf WISE0833+0052	2.50 HR
1	GS-2015B-Q-11	Jensen-Clem	US	GPI	The first detection of polarized radiation from exoplanets	9.50 HR
1	GS-2015B-Q-12	Kavelaars	CA	GMOS-S	Tracking observations in preparation for New Horizons fly-by.	30.00 HR
1	GS-2015B-Q-13	Kim	KR	GMOS-S	Spectroscopy of Early and Peculiar Supernovae from the KMTNet	3.00 HR
1	GS-2015B-Q-14	Lacy	US	GSAOI	The highest resolution view of distant massive galaxies	16.20 HR
1	GS-2015B-Q-15	Lira	CL	Flamingos 2	Reverberation Mapping of high-z QSOs: the final stages	1.50 HR
1	GS-2015B-Q-16	Luhman	US	GMOS-S	Testing Model Atmospheres with the Coldest Known Brown Dwarf	6.80 HR
1	GS-2015B-Q-17	Marois	CA/US	GPI	GPI detailed spectroscopic and astrometric characterization of HR 8799cde.	10.00 HR
1	GS-2015B-Q-18	Martini	US	GMOS-S	Search for z>6 QSOs with the Dark Energy Survey	10.00 HR
1	GS-2015B-Q-19	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
1	GS-2015B-Q-20	Prieto	CL	GMOS-S	Near Explosion GMOS-South Spectroscopy of ASAS-SN and CHASE Nearby Supernovae	3.50 HR

1	GS-2015B-Q-21	Richtler	CL	GMOS-S	Isolated ellipticals - key objects for the dark matter problem?	7.00 HR
1	GS-2015B-Q-22	Rodney	US	GMOS-S	The Next Frontier: High-Redshift Supernovae in the HST Frontier Fields (South)	2.50 HR
1	GS-2015B-Q-23	Rojo	CL	GPI	Investigating seasonal changes in Titan's meteorology through cloud monitoring with GPI	1.80 HR
1	GS-2015B-Q-24	Shannon	AU	GMOS-S	The optical counterpart to a Fast Radio Burst	1.50 HR
1	GS-2015B-Q-25	Steiner	BR	GMOS-S	LLP - The Gemini Survey of Galactic Nuclei - GSGN	21.60 HR
1	GS-2015B-Q-26	Tucker	US/AU	GMOS-S	Catching Supernovae in the Act with KEGS (Kepler Extra-Galactic Survey) (South)	6.80 HR
1	GS-2015B-Q-27	Webster	AU	Flamingos 2	Understanding the Physics of the Broad Line Region	4.00 HR
1	GS-2015B-Q-28	Yang	KR	GMOS-S	First Systematic Survey of the Environment of Submilimeter Galaxies (South)	7.50 HR
2	GS-2015B-Q-29	Ammons	US	GSAOI	A GEMS Probe for Superearths Orbiting Luhman 16AB	1.50 HR
2	GS-2015B-Q-30	Bleem	US	GMOS-S	SPT-CL J0329?2330: Spectroscopic Observations of an Exceptional High-Redshift Galaxy Cluster	7.30 HR
2	GS-2015B-Q-31	Cenko	US	GMOS-S	The Demographics of Tidal Disruption Flares (South)	3.00 HR
2	GS-2015B-Q-32	Cerqueira	BR	GMOS-S	Spatially distributed line ratios for the HH1/2 system	5.60 HR
2	GS-2015B-Q-33	Chiang	US/CL/BR	GMOS-S	Mapping out the Densest Structures in the COSMOS Field at z~2?3 (South)	8.14 HR
2	GS-2015B-Q-34	Christiaens	CL	GPI	Planets in the transition disk of Herbig AeBe stars	2.80 HR
2	GS-2015B-Q-35	Crossfield	US	GPI	Exometeorology: Searching for Weather on Beta Pictoris b	17.00 HR
2	GS-2015B-Q-36	Cúneo	AR	GMOS-S	Chemical abundances of polluted visible component atmosphere in black hole binary systems (South)	4.00 HR
2	GS-2015B-Q-37	Duchene	US	GPI	Assessing the fundamental limits of multiple star formation	18.50 HR
2	GS-2015B-Q-38	Faifer	AR/BR	Flamingos 2, GMOS-S	The Brazil-Argentina Gemini Group of globular Cluster systems (BAGGS): FLAMINGOS-2 and GMOS data for NGC1395	10.80 HR
2	GS-2015B-Q-39	Glazebrook	AU/CA	GMOS-S	Observational testing of a new model of angular momentum as a fundamental driver of clumpy disks. (South)	2.92 HR
2	GS-2015B-Q-40	Kim	KR	GMOS-S	GMOS-S observation for distant galaxy clusters with extraordinarily high star formation rates	8.00 HR
2	GS-2015B-Q-41	Lee	KR	GMOS-S	The Evolution-Free Dark Energy Test: Spectroscopy of Early-Type Host Galaxies of Type Ia Supernovae	6.00 HR
2	GS-2015B-Q-42	Liu	US	GMOS-S	Spectroscopic Follow-Up of Variability Selected Binary Supermassive Black Hole Candidates	4.80 HR
2	GS-2015B-Q-43	Mendes de Oliveira	BR	GSAOI	Mapping the dust extinction and censing the star cluster population in the merging system HCG 31	4.20 HR
2	GS-2015B-Q-44	Millar-Blanchaer	US/CA	GPI	Constraining the Dust grain population of Beta Pic's Inner Disk	8.50 HR
2	GS-2015B-Q-45	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
2	GS-2015B-Q-46	Muzic	CL	Flamingos 2	Probing the effects of environment on brown dwarf formation	10.00 HR
2	GS-2015B-Q-47	Opitz	US	GSAOI	Astrometry and Binarity of WISE Y dwarfs with MCAO	4.30 HR

2	GS-2015B-Q-48	Piatti	AR	GMOS-S	Unveiling the origin of the LMC clusters NGC1928 and NGC1939	3.40 HR
2	GS-2015B-Q-49	Pritchard	AU	Flamingos 2, GMOS-S	Spectroscopic Observations of High-z Superluminous Supernovae	4.80 HR
2	GS-2015B-Q-50	Rameau	CA	GPI	A GPI search for planets around remarkable young and nearby stars	9.60 HR
2	GS-2015B-Q-51	Rotermund	CA/US	GMOS-S	Detecting Dark Matter Subhalos with ALMA and GMOS-S/IFU using Strongly Lensed Submm Galaxies	31.00 HR
2	GS-2015B-Q-52	Scholz	CA	Flamingos 2	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (South)	13.88 HR
2	GS-2015B-Q-53	Shim	KR	GMOS-S	cd MgII absorbers in cluster environment	8.00 HR
2	GS-2015B-Q-54	Tappert	CL	GMOS-S	Recovery of old novae	10.50 HR
2	GS-2015B-Q-55	Telles	BR	GMOS-S	Towards precision cosmology with HII galaxies	5.50 HR
2	GS-2015B-Q-56	Yanny	US/BR	GMOS-S	Imaging Follow-up of Milky-Way companions revealed by the Dark Energy Survey	14.89 HR
3	GS-2015B-Q-57	Baron	CA	Flamingos 2, GMOS-S	Wide Imaging Search for Benchmark Planets	23.00 HR
3	GS-2015B-Q-58	Bessiere	CL	GMOS-S	The evolution of quasar host galaxies	11.00 HR
3	GS-2015B-Q-59	Chanchaiworawit	US	GMOS-S	Spectroscopic Confirmation of LAE Candidates at z=6.5: Evidence of the highest redshift protocluster	46.00 HR
3	GS-2015B-Q-60	Diaz/Diaz	AR	Flamingos 2	Galactic feedback and the circum-galactic medium of z~2.3 galaxies	3.50 HR
3	GS-2015B-Q-61	Faundez-Abans	BR	GMOS-S	Kinematics of the peculiar galaxy AM 0405-371	1.90 HR
3	GS-2015B-Q-62	Graham	US	GMOS-S	Understanding the Power Source in Type Ia Supernovae with Nebular Phase Spectroscopy	18.30 HR
3	GS-2015B-Q-63	Hernandez-Jimenez	BR	GMOS-S	Constraining two physically distinct inflow mechanisms in the minor merger AM0737-764	3.90 HR
3	GS-2015B-Q-64	Hsieh	US	GMOS-S	Observations of the Activity of Main-Belt Comets P/2010 R2, 233P, and 313P (South)	6.00 HR
3	GS-2015B-Q-65	Jeong	KR	GMOS-S	Nature of high-z SMGs in ADF-S	0.00 HR
3	GS-2015B-Q-66	Kim	KR	GMOS-S	Search for Activity in Lixiaohua Family Asteroids (South)	0.07 HR
3	GS-2015B-Q-67	Lee	KR	Flamingos 2	NIR spectroscopy of strong line emitting SNRs in nearby galaxies (South)	0.00 HR
3	GS-2015B-Q-68	M.Manseau	CA	GMOS-S	A Spectroscopic Analysis of Chemically Stratified DAO White Dwarfs in the Sloan Digital Sky Survey (South)	4.00 HR
3	GS-2015B-Q-69	Mendes de Oliviera	BR	GMOS-S	The Cosmic Penguin cooking an AGN and a Tidal Dwarf Galaxy.	6.10 HR
3	GS-2015B-Q-70	Parisi	AR/CL	GMOS-S	Accurate Ages, Metal Abundances and Kinematics of a Large Sample of Small Magellanic Cloud Star Clusters and Surrounding Fields	11.00 HR
3	GS-2015B-Q-71	Schlaufman	US	GMOS-S	An All-Sky Search for the Brightest Metal-Poor Stars (South)	42.90 HR
3	GS-2015B-Q-72	Sung	KR	GMOS-S	Precision measurements of the central dark matter distribution in low mass dwarf galaxies: GMOS-N long-slit absorption line spectroscopy of DDO 210	10.00 HR
3	GS-2015B-Q-73	Wade	CA	GMOS-S	Monitoring the magnetospheric structure of the first candidate extra-Galactic magnetic massive stars	12.30 HR
3	GS-2015B-Q-74	Webster	AU	Flamingos 2	Understanding the Physics of the Broad Line Region	12.71 HR

D.3 2016A Science Programs – Gemini North

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GN-2016A-C-1	Baldwin	AU	GNIRS	A comparison of spectroscopic and dynamical IMF determinations in the near-infrared	10.00 HR
C	GN-2016A-C-2	Levesque	US	GMOS-N	Red Supergiants in the Extremely Metal Poor Sextans Galaxies: Local Analogs of Massive Stars in the Early Universe	2.00 NIGHT
1	GN-2016A-LP-1	Kasliwal	LP	GMOS-N	Rapid Spectroscopy of Elusive Transients and Young Supernovae	23.10 HR
1	GN-2016A-LP-2	Huitson	LP	GMOS-N	The First Survey Dedicated to the Detection and Characterization of Clouds in Exoplanet Atmospheres	12.00 HR
1	GN-2016A-LP-3	Fraser	LP	GMOS-N,NIRI	COL-OSSOS: COLours for the Outer Solar System Object Survey	50.00 HR
1	GN-2016A-LP-4	Balogh	LP	GMOS-N	The GOGREEN Survey of dense galaxy environments at 1<z<1.5	45.50 HR
2	GN-2016A-LP-5	Shen	LP	GNIRS	A GNIRS Near-IR Spectroscopic Survey of z>5.7 Quasars	35.90 HR
2	GN-2016A-LP-6	Huitson	LP	GMOS-N	The First Survey Dedicated to the Detection and Characterization of Clouds in Exoplanet Atmospheres	11.80 HR
2	GN-2016A-LP-7	Crossfield	LP	NIRI	Validating K2?s Habitable and Rocky Planets with AO Imaging	10.00 HR
1	GN-2016A-Q-1	Yoon	KR	GRACES	Search for signatures of pair-instability supernova nucleosynthesis in alpha-enhanced metal poor stars	10.60 HR
1	GN-2016A-Q-2	Yang	KR	GMOS-N	Star Formation Efficiency and AGN Feedback in Gas-Rich Post-Starburst Galaxies	12.00 HR
1	GN-2016A-Q-3	van Velzen	US	GMOS-N	Reverberation mapping of stellar tidal disruption flares	6.20 HR
1	GN-2016A-Q-4	van Kerkwijk	CA	GMOS-N, GNIRS,NIRI	SN2014J at very late phases	18.00 HR
1	GN-2016A-Q-5	Tominaga	Subaru	GMOS-N	Detection and Follow-up Observations of Type II Plateau Supernovae	7.50 HR
1	GN-2016A-Q-6	Storchi-Bergmann	BR	NIFS	NIFS survey of feeding and feedback processes in nearby Active Galaxies	15.00 HR
1	GN-2016A-Q-7	Stern	US	GNIRS	Spatially Resolving the Kinematics of the ~100 uas Quasar Broad Line Region Using Spectroastrometry	15.00 HR
1	GN-2016A-Q-8	Shim	KR	GRACES	Probing Circumgalactic Medium of Cluster Galaxies using Background QSO	7.50 HR
1	GN-2016A-Q-9	Seth	US	GNIRS	A GNIRS Survey of the Nearest Nuclear Star Clusters	13.10 HR
1	GN-2016A-Q-10	Scholz	CA	NIRI	Rapid Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (North)	5.00 HR
1	GN-2016A-Q-11	Sardane	US	GMOS-N	Mapping cool, metal-rich gas around z < 0.08 galaxies	4.00 HR
1	GN-2016A-Q-12	Ross	CA	NIFS	Testing the triggering mechanisms of SMGs with spatially-resolved dynamics	14.00 HR
1	GN-2016A-Q-13	Moskovitz	US	GMOS-N,GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50 HR
1	GN-2016A-Q-14	Mendez	UH	GRACES	A search for spectroscopic binary central stars of planetary nebulae	12.00 HR
1	GN-2016A-Q-15	Meech	UH	GMOS-N	The Manx CometsÄiTesting Solar System Formation Models	6.90 HR
1	GN-2016A-Q-16	Liss	US	GMOS-N	Star Clusters in Interacting Dwarf Galaxies	11.60 HR

1	GN-2016A-Q-17	Lee	KR	GRACES	High-Resolution Spectroscopy of Candidate Ultra Metal-Poor Stars from Sloan Digital Sky Survey	9.80 HR
1	GN-2016A-Q-18	Kim	KR	NIFS	New, unveiled epoch of IRC+10216	3.00 HR
1	GN-2016A-Q-19	Karouzos	KR	GMOS-N	Unveiling circumnuclear star formation: AGN feeding vs feedback?	12.40 HR
1	GN-2016A-Q-20	JofrÈ	AR	GRACES	The chemical signature of giant stars with planets	3.10 HR
1	GN-2016A-Q-21	Im	KR	GMOS-N	Spectroscopic Identification of A Faint Quasar at z ~ 7	9.00 HR
1	GN-2016A-Q-22	Hosek	UH	NIFS	The Arches Cluster: Initial Mass Function and Stellar Evolution	13.00 HR
1	GN-2016A-Q-23	Ho	UH	NIRI	Gemini/NIRI narrowband imaging of H2 1-0 S(1): probing the structure of galactic winds in the local Universe	6.00 HR
1	GN-2016A-Q-24	Hinkle	US	NIRI	Imaging the Expanding Debris Cloud around Sakurai's Object	1.00 HR
1	GN-2016A-Q-25	Hamann	US	GNIRS	Feedback vs Cold Mode Accretion: Accurate Velocities for Complex Infall/Outflow Gas Near Redshift 3 Quasars	1.70 HR
1	GN-2016A-Q-26	Hagelberg	UH	GMOS-N	Probing the atmosphere of an evaporating Jupiter candidate	4.40 HR
1	GN-2016A-Q-27	Gonzalez	US	GMOS-N	A Metallicity Determination for the Diffuse Emission around NGC 4874 in the Coma Cluster	11.70 HR
1	GN-2016A-Q-28	Gladders	US	GMOS-N	Time delays for the sextuply-lensed quasar SDSS J2222+2745 from GMOS	3.80 HR
1	GN-2016A-Q-29	Garnavich	US	GMOS-N	Return to the Heart of Darkness: An Unbiased Survey of Void Galaxies	13.00 HR
1	GN-2016A-Q-30	Frye	US	GMOS-N	Spectroscopic redshifts of the lenses producing the brightest high-z sources in the Planck all-sky survey	10.00 HR
1	GN-2016A-Q-31	Esplin	US	GNIRS	Searching for the bottom of the IMF in Ophiuchus and RCrA (North)	3.20 HR
1	GN-2016A-Q-32	Ebeling	UH	GMOS-N	Jellyfish: the dynamics of extreme ram-pressure stripping	4.00 HR
1	GN-2016A-Q-33	de Kleer	US	NIRI	Observing Io's volcanoes in eclipse: Eruption temperatures and SO gas content	3.00 HR
1	GN-2016A-Q-34	de Kleer	US	NIRI	Linking Io's Volcanic Activity to Plasma Torus Variability	20.00 HR
1	GN-2016A-Q-35	Cote	CA	NIFS	Black Holes in the Smallest Galaxies	10.90 HR
1	GN-2016A-Q-36	Chambers	UH	GMOS-N,GNIRS	Pan-STARRS Survey for Counterparts to ALIGO GW events	4.00 HR
1	GN-2016A-Q-37	Bowler	US	NIFS	Spectroscopic Confirmation of the Planetary Companion ROXs12 b	7.00 HR
1	GN-2016A-Q-38	Beck	US	NIFS	Understanding protostellar jet launching in Herbig Stars	2.50 HR
1	GN-2016A-Q-39	Almeida	BR	Graces	Radial velocity confirmation of an exoplanet candidate around an evolved compact binary	3.75 HR
2	GN-2016A-Q-40	Tremblay	US	NIFS	A Multi-Wavelength Approach to AGN Feedback and Star- Formation	20.00 HR
2	GN-2016A-Q-41	Stockton	UH	GNIRS	The Cold-Gas Environments of Sub-Millimeter Galaxies	10.00 HR
2	GN-2016A-Q-42	Simpson	US	GNIRS	Characterizing the Candidate Planetary Nebulae in the Galactic Center with Gemini GNIRS	1.00 HR
2	GN-2016A-Q-43	Scholz	CA	NIRI	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (North)	13.13 HR

2	GN-2016A-Q-44	Sand	US	GMOS-N	The first high quality Mg II reverberation lag measurement (South)	11.00 HR
2	GN-2016A-Q-45	Salim	US	GMOS-N	Metallicity calibrations for high-redshift galaxies	31.00 HR
2	GN-2016A-Q-46	Pavlov	US	GMOS-N, NIRI	Confirming the nature of the knot near pulsar B1951+32	2.20 HR
2	GN-2016A-Q-47	Moskovitz	US	GMOS-N, GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50 HR
2	GN-2016A-Q-48	Liu	US	GMOS-N	Signposts of Quasar Feedback in the High-Redshift Universe	15.00 HR
2	GN-2016A-Q-49	Liu	US	GMOS-N	IFU mapping of the most energetic BALQSO outflows	7.20 HR
2	GN-2016A-Q-50	Leggett	US	NIRI	Near-Infrared Imaging of our 250K Neighbor	24.00 HR
2	GN-2016A-Q-51	Lee	KR	GMOS-N	The Evolution-Free Dark Energy Test: Spectroscopy of Early-Type Host Galaxies of Type Ia Supernovae	8.00 HR
2	GN-2016A-Q-52	Lee	KR	GMOS-N	Stellar population gradients of local early-type galaxies in different NUV and MIR classes	5.00 HR
2	GN-2016A-Q-53	Knight	US	GMOS-N NIRI	Multi-scale investigation of the coma of comet 67P/Churyumov-Gerasimenko: Combined Gemini and Rosetta study of activity	10.20 HR
2	GN-2016A-Q-54	Kilic	US	GMOS-N	The Shortest Period Binary White Dwarfs in SDSS DR10 (North)	22.45 HR
2	GN-2016A-Q-55	Harrison	US	GNIRS	Quantification of the 13^C Abundance in the Secondary Stars of Cataclysmic Variables	1.80 HR
2	GN-2016A-Q-56	Hamann	US	GRACES	A Remarkable New Transient Outflow in the Quasar PG1411+442	1.30 HR
2	GN-2016A-Q-57	Hall	CA	GMOS-N	Contemporaneous spectra of Chandra-observed BAL quasars	8.50 HR
2	GN-2016A-Q-58	Greene	US	GMOS-N	Black Holes in Dwarf Galaxies at Intermediate Redshift	11.00 HR
2	GN-2016A-Q-59	Gianninas	CA/US	GMOS-N	Searching for Pulsations in Mixed Atmosphere Extremely Low-mass White Dwarfs	4.10 HR
2	GN-2016A-Q-60	Ebeling	UH	GMOS-N	GMOS imaging of massive galaxy clusters at z>0.5	10.00 HR
2	GN-2016A-Q-61	den Brok	US	NIFS	Massive black holes in small galaxies	9.50 HR
2	GN-2016A-Q-62	Cortesi	AR/BR	GMOS-N	The Brazil-Argentina Gemini Group of globular Cluster systems (BAGGS): Tracing the star formation history of the S0 NGC4382 with GMOS spectroscopy of globular clusters and field stars	9.10 HR
2	GN-2016A-Q-63	Chu	UH	GNIRS	Investigating the Structure and Composition of Molecular Clouds in Preparation for the James Webb Space Telescope	9.75 HR
2	GN-2016A-Q-64	Chies Santos	BR	GMOS-N	Probing Assembly Histories of MASSIVE Survey Galaxies from their Globular Cluster Colors	7.00 HR
2	GN-2016A-Q-65	Charbonnier	BR	NIRI	In the outskirts of compact massive quiescent galaxies at intermediate redshifts	3.20 HR
2	GN-2016A-Q-66	Chapman	CA	GMOS-N, GNIRS	Redshifts for the SCUBA-2 CLS brightest SMGs.	16.00 HR
2	GN-2016A-Q-67	Carlin	US	GRACES	Recreating the chemical evolution of the Sagittarius dwarf spheroidal from its tidal debris	37.60 HR
2	GN-2016A-Q-68	Bresolin	UH	GMOS-N	Metallicity gradients in the smallest spiral galaxies	6.40 HR
2	GN-2016A-Q-69	Bassino	AR	GMOS-N	Reconstructing the history of highly disturbed galaxies by means of their globular cluster systems	3.30 HR

2	GN-2016A-Q-70	Antoniadis	CA	GMOS-N	Revisiting the mass of the millisecond pulsar J1012+5307	12.00 HR
2	GN-2016A-Q-71	Almeida	BR	GRACES	Radial velocity confirmation of an exoplanet candidate around an evolved compact binary	3.75 HR
3	GN-2016A-Q-72	Wade	CA	GRACES	The nature of photometric variability in white dwarf stars	8.40 HR
3	GN-2016A-Q-73	Valenti	US	GMOS-N	Nebular observations of SNe type II (North)	4.60 HR
3	GN-2016A-Q-74	Stockton	UH	GNIRS	The Cold-Gas Environments of Sub-Millimeter Galaxies	10.00 HR
3	GN-2016A-Q-75	Schlaufman	US	GMOS-N	An All-Sky Search for the Brightest Metal-poor Stars (North)	79.40 HR
3	GN-2016A-Q-76	Saker	AR	GMOS-N	Gaseous disks in white dwarfs	2.80 HR
3	GN-2016A-Q-77	S. Couto	BR	GMOS-N	Probing the relation between the radio jet and the circumnuclear gas in the radio galaxy 4C+29.30	4.50 HR
3	GN-2016A-Q-78	Richardson	CA	GRACES	The Unusual Pulsations from the Interacting Binary MWC 314	8.10 HR
3	GN-2016A-Q-79	Mirabel	US/AR	GNIRS,NIRI	STAR FORMATION TRIGGERED BY MICROQUASAR JETS	1.90 HR
3	GN-2016A-Q-80	Miller	CA	GMOS-N	Globular Cluster Spectroscopy of dEs in the Local Volume (North)	12.61 HR
3	GN-2016A-Q-81	Mendez	UH	GRACES	A search for spectroscopic binary central stars of planetary nebulae	20.00 HR
3	GN-2016A-Q-82	Malo	CA	GRACES	Identification and characterization of very low-mass and brown dwarf candidate members of nearby young associations	13.80 HR
3	GN-2016A-Q-83	Liu	US	GMOS-N	Hunting for Massive Binary Black Holes with Continued Quasar Spectroscopic Monitoring	12.00 HR
3	GN-2016A-Q-84	Lee	KR	GNIRS	GNIRS spectroscopy of strong line emitting SNRs in nearby galaxies	2.32 HR
3	GN-2016A-Q-85	Krafton	US	GMOS-N	Late-Time Dust Formation in Core-Collapse Supernovae	10.40 HR
3	GN-2016A-Q-86	Kim	KR	GNIRS	Black hole mass versus stellar velocity dispersion relation of red AGNs	7.00 HR
3	GN-2016A-Q-87	Jha	US	GMOS-N	Spectroscopy of Type Iax Supernovae (North)	1.99 HR
3	GN-2016A-Q-88	Hsieh	US	GMOS-N	Main-Belt Comet Activity and Nucleus Characterization (North)	2.00 HR
3	GN-2016A-Q-89	Herczeg	US	GMOS-N	Accretion and the formation of very low mass objects (North)	17.80 HR
3	GN-2016A-Q-90	Hamann	US	GNIRS	Outflows & Feedback in Extremely Red Quasars	30.00 HR
3	GN-2016A-Q-91	Ferrero	AR	GNIRS	A High Resolution Near Infrared Spectral Atlas of O stars with Gemini	2.00 HR
3	GN-2016A-Q-92	Cidale	AR	GNIRS	Unveiling the nature of the unclassified B[e] star MWC 819	1.90 HR
3	GN-2016A-Q-93	Chies Santos	CA/US	GMOS-N	Probing Assembly Histories of MASSIVE Survey Galaxies from their Globular Cluster Colors	17.00 HR
4	GN-2016A-Q-94	Smith Castelli	AR	GMOS-N	Stellar population and Initial Mass Function analysis of the bright elliptical galaxies NGC 7619 and NGC 7626 (North)	5.60 HR
4	GN-2016A-Q-95	Manset	CA	GRACES	Unveiling the Nature of FS CMa Type Stars	7.60 HR
4	GN-2016A-Q-96	Cochetti	AR	GNIRS	Be stars spectroscopic variability in the infrared	4.30 HR

D.4 2016A Science Programs – Gemini South

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GS-2016A-C-1	Kool	AU	GSAOI	Project SUNBIRD: Supernovae UNmasked By Infra-Red Detection	2.00 NIGHT
1	GS-2016A-LP-1	Balogh	LP	GMOS-S	The GOGREEN Survey of dense galaxy environments at 1<z<1.5	24.70 HR
1	GS-2016A-LP-2	Fritz	LP	GMOS-S, GSAOI	Probing the dark halo of the Milky Way with GeMS/GSAOI	20.40 HR
1	GS-2016A-LP-3	Masiero	LP	GMOS-S	Follow up of newly discovered Near-Earth objects from the NEOWISE survey	8.00 HR
1	GS-2016A-LP-7	Kasliwal	LP	GMOS-S	Rapid Spectroscopy of Elusive Transients and Young Supernovae	4.00 HR
2	GS-2016A-LP-5	Buckley-Geer	LP	GMOS-S	Spectroscopic Confirmation and AO imaging Follow-Up of Dark Energy Survey Strong Lensing Systems and Spectra for Photometric Redshift Calibration	12.00 HR
2	GS-2016A-LP-6	Chen	LP	GPI	Characterizing Dusty Debris in Exoplanetary Systems	19.80 HR
2	GS-2016A-LP-8	Hynes	LP	GMOS-S	Dynamical Masses of Black Holes and Neutron Stars from the Galactic Bulge Survey	30.00 HR
2	GS-2016A-LP-9	Crossfield	LP	DSSI	Validating K2?s Habitable and Rocky Planets with AO Imaging	10.00 HR
1	GS-2016A-Q-1	Tappert	CL	GMOS-S	Recovery of old novae	3.30 HR
1	GS-2016A-Q-2	Strauss	US	GMOS-S	Spectroscopic identification of new low-luminosity quasars at z > 6	27.90 HR
1	GS-2016A-Q-3	Steiner	BR	GMOS-S	LLP - The Gemini Survey of Galactic Nuclei - GSGN	17.00 HR
1	GS-2016A-Q-4	Smith	US	Phoenix	[Fe II] Kinematics of Galactic Luminous Blue Variables	20.00 HR
1	GS-2016A-Q-5	Sheppard	US	GMOS-S	The Inner Oort Cloud Population	2.00 HR
1	GS-2016A-Q-6	Scholz	CA	Flamingos 2	Rapid Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (South)	5.20 HR
1	GS-2016A-Q-7	Sawicki	CA	GMOS-S	Spectroscopy of very luminous z~6 galaxies from the HSC-Wide survey	15.60 HR
1	GS-2016A-Q-8	Rettura	US	Flamingos 2, GMOS-S	The Gemini survey of the most distant galaxy clusters in the ~100deg2 Spitzer-SPT Deep Field	13.00 HR
1	GS-2016A-Q-9	Rest	US	GMOS-S	Spectrophotometric Time Series of Eta Carinae's Great Eruption	22.60 HR
1	GS-2016A-Q-10	Principe	CL	GPI	Searching for Evidence of Planet Formation in a Nearby Solar Nebula Analog	4.10 HR
1	GS-2016A-Q-11	Piskorz	US	DSSI	Imaging Friends of Hot Jupiters	0.80 HR
1	GS-2016A-Q-12	Patience	CA	GPI	Characterizing the atmosphere of the imaged planet HD 95086 b with GPI	4.00 HR
1	GS-2016A-Q-13	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
1	GS-2016A-Q-14	Montet	US	DSSI	Fundamental Parameters of Young M Dwarfs	7.30 HR
1	GS-2016A-Q-15	Meshkat	US	GPI	Occurrence of giant planets in the dustiest new WISE debris disk systems	6.00 HR
1	GS-2016A-Q-16	Mennickent	CL	Flamingos 2	Infrared detection of circumbinary planets around NN Ser	3.00 HR
1	GS-2016A-Q-17	McCollum	US	Flamingos 2, GSAOI	Identifying the Progenitor Star for a New Red Transient	3.40 HR
1	GS-2016A-Q-18	Mauro	AR/CL	GSAOI	Searching for past multiple bursts of star formation in Terzan 5, a fossil relic of the Galactic bulge	9.30 HR

1	GS-2016A-Q-19	Lira	CL	Flamingos 2	Reverberation Mapping of high-z QSOs: the final stages	1.50 HR
1	GS-2016A-Q-20	Lin	US	GMOS-S	Measuring the Distance to an Intermediate-mass Black Hole with Gemini	3.90 HR
1	GS-2016A-Q-21	Levesque	US	Flamingos 2, GMOS-S	Rapid Spectroscopy of SN 2010da: Observing a Neutron Star + Luminous Blue Variable Binary in Outburst	3.00 HR
1	GS-2016A-Q-22	Lee	KR	GSAOI	Understanding Clumping in circumstellar shells around Luminous Blue Variables	2.00 HR
1	GS-2016A-Q-23	Kraus	US/CL/CA	GPI	The Planetary Systems of Young Massive Stars	30.40 HR
1	GS-2016A-Q-24	KIM	KR	GMOS-S	Optical spectroscopy of Early and Peculiar Supernovae found by the KMTNet	3.00 HR
1	GS-2016A-Q-25	Kilic	US/AR	GMOS-S	A Benchmark Pulsating White Dwarf Companion to PSR J1738+0333	11.00 HR
1	GS-2016A-Q-26	Horch	US	DSSI	Towards a True Population II Mass-Luminosity Relation	5.30 HR
1	GS-2016A-Q-27	Hirano	Subaru	GSAOI	ESPRINT II: A New Search for Transiting Planets Unveiled by K2	3.75 HR
1	GS-2016A-Q-28	Henry	US	DSSI	Searching for Companions to Nearby Stars on Solar System Scales	25.00 HR
1	GS-2016A-Q-29	Gromadzki	CL	GSAOI	Trigonometric parallax of ancient T dwarf WISE0833+0052 (2016A)	2.50 HR
1	GS-2016A-Q-30	Greenbaum	US	GPI	Probing the inner regions of HD142527 and HD100546	4.50 HR
1	GS-2016A-Q-31	Ghez	US	GSAOI	Using MCAO to Enable Unique Test of General Relativity at the Galactic Center	7.20 HR
1	GS-2016A-Q-32	Esplin	US	Flamingos 2	Searching for the bottom of the IMF in Ophiuchus and RCrA (South)	2.70 HR
1	GS-2016A-Q-33	Dong	US	GPI	Planet-drive spiral arms in SAO 206462: a direct test of dynamical model predictions	2.50 HR
1	GS-2016A-Q-34	Do	US	GSAOI	Measuring the orbital history of the ultra-faint dwarf galaxy Hercules with GSAOI	10.50 HR
1	GS-2016A-Q-35	Currie	CA	GPI	Confirming and Characterizing Young Planetary Companions with GPI	5.50 HR
1	GS-2016A-Q-36	Currie	Subaru	GPI	A Sensitive GPI Search for Super-Jovian Planets Orbiting WISE-Detected Early-Type Stars	15.00 HR
1	GS-2016A-Q-37	Cuadra	CL	GSAOI	Star formation and dynamics at < 2.5 pc from Sgr A*	6.80 HR
1	GS-2016A-Q-38	Cohen	CL	GSAOI	Unveiling the Heart of the Milky Way: Ages and Structural Parameters of Inner Galactic Bulge Globular Clusters	2.40 HR
1	GS-2016A-Q-39	Cassata	CL	Flamingos 2	Compactness-dependent quenching in z~2 galaxies?	10.00 HR
1	GS-2016A-Q-40	Brandt	US	GPI	Imaging the Only Known White Dwarf with a >8 Msun Progenitor	1.50 HR
1	GS-2016A-Q-41	Bary	US	Phoenix	High-Resolution Spectroscopy of Orbitally-Modulated Accretion Activity in Pre-Main Sequence Binaries	11.00 HR
1	GS-2016A-Q-42	Arroway	CA	GMOS-S	Tracking Observations in Preparation for New Horizons FlyBy Kuiper Belt Objects	11.90 HR
1	GS-2016A-Q-43	Arias	AR	Phoenix	Molecular emission bands in the symbiotic star BI Crucis	1.40 HR
2	GS-2016A-Q-44	Urrutia-Viscarra	CL	GMOS-S	On the 2D structure and kinematics of the tidal dwarf candidate in the gas-rich interacting galaxy pair NGC 3166/9	8.00 HR
2	GS-2016A-Q-45	Treister	CL	GMOS-S	Resolving the peak of the Cosmic X-ray Background: Optical Follow-up for the NuSTAR Serendipitous Survey	10.20 HR

2	GS-2016A-Q-46	Torres-Flores	CL	GMOS-S	Understanding the origin of a peculiar star-forming region in NGC 6845A	3.20 HR
2	GS-2016A-Q-47	Scholz	CA	Flamingos 2	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (South)	13.88 HR
2	GS-2016A-Q-48	Sawicki	CA	GMOS-S	Spectroscopy of very luminous z~6 galaxies from the HSC-Wide survey	10.40 HR
2	GS-2016A-Q-49	Sand	US	GMOS-S	The first high quality Mg II reverberation lag measurement (South)	22.20 HR
2	GS-2016A-Q-50	Rodriguez	CL	GMOS-S	Testing Type II supernova as cosmological probes at near-infrared wavelength	6.50 HR
2	GS-2016A-Q-51	Parsons	CL	GMOS-S	Accurate component masses and radii of three white dwarf-M dwarf binaries observed by Kepler	16.00 HR
2	GS-2016A-Q-52	Nogueira-Cavalcante	BR	GMOS-S	Star Formation Quenching in Different Morphological Types of Green Valley Galaxies at Intermediate Redshifts	10.80 HR
2	GS-2016A-Q-53	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
2	GS-2016A-Q-54	McConnachie	CA	Flamingos 2	Precision photometry of globular clusters with GeMS/GSAOI: the need for FLAMINGOS-2	1.40 HR
2	GS-2016A-Q-55	Mauerhan	US	GSAOI	GeMS narrowband imaging of the massive star factory Sagittarius B	4.20 HR
2	GS-2016A-Q-56	Liu	US	GMOS-S	Spectroscopic Follow-Up of Variability Selected Binary Supermassive Black Hole Candidates	1.60 HR
2	GS-2016A-Q-57	Kong	US	GMOS-S	A Spectroscopic Study of the Black Hole Binary MAXI J1659-152 in Quiescence	2.30 HR
2	GS-2016A-Q-58	Kilic	US	GMOS-S	The Shortest Period Binary White Dwarfs in SDSS DR10 (South)	3.20 HR
2	GS-2016A-Q-59	Im	KR	GMOS-S	Spectroscopic Confirmation of Faint Quasars at z~6	6.70 HR
2	GS-2016A-Q-60	Hargreaves	US	Phoenix	Hydrocarbon emission in the polar regions of Jupiter	16.70 HR
2	GS-2016A-Q-61	Graham	US	GMOS-S	Understanding the Power Source in Type Ia Supernovae with Nebular Phase Spectroscopy	23.90 HR
2	GS-2016A-Q-62	Ferrero	AR	GSAOI	GSAOI+GeMS high resolution images of protostellar jets: The case of HH 137/138	2.80 HR
2	GS-2016A-Q-63	Crnojevic	US	Flamingos 2	Environment and the evolution at low-mass galactic scales: clues from the Cen A group	22.10 HR
2	GS-2016A-Q-64	Cody	US	DSSI	The effect of binarity on protoplanetary disk dissipation and accretion	30.00 HR
2	GS-2016A-Q-65	Cerqueira	BR	GMOS-S	Investigating different excitation conditions in the HH 228 jet	8.80 HR
2	GS-2016A-Q-66	Caso	AR	GMOS-S	Globular clusters in Antlia: a wider photometric look	1.80 HR
2	GS-2016A-Q-67	Carrasco	US	GSAOI	Investigating galaxy structure and mass assembly at z>3 with GeMS/GSAOI	20.00 HR
2	GS-2016A-Q-68	Baume	AR	Flamingos 2	Embedded clusters in the Carina Galactic Arm	1.60 HR
2	GS-2016A-Q-69	Baron	CA	Flamingos 2, GMOS-S	WEIRD : Wide orbit Exoplanet search with InfraRed Direct imaging	15.70 HR
2	GS-2016A-Q-70	Bahramian	US	Flamingos 2	Determining the nature of donor stars in sub-luminous transient X-ray binaries	7.60 HR
2	GS-2016A-Q-71	Angeloni	US	GMOS-S	Spectroscopic follow-up of puzzling OGLE sources: a new class of variable stars?	5.00 HR
2	GS-2016A-Q-72	Ammons	US	GSAOI	The Best Parallaxes and a Limit on the Giant Planet Occurrence Rate for Nearby T Dwarf Hosts	4.20 HR

2	GS-2016A-Q-73	Abia	US	Phoenix	Extragalactic AGB carbon stars as probes to test the origin of fluorine in the universe.	20.30 HR
3	GS-2016A-Q-74	Weidmann	AR	GMOS-S	Determining the actual nature of weak emission line stars in the nucleus of Planetary Nebulae	2.10 HR
3	GS-2016A-Q-75	Valenti	US	GMOS-S	Nebular observations of SNe type II (South)	6.90 HR
3	GS-2016A-Q-76	Schlaufman	US	GMOS-S	An All-Sky Search for the Brightest Metal-poor Stars (South)	74.00 HR
3	GS-2016A-Q-77	Origlia	US	Phoenix	MIRA STARS AS PROBES OF THE STAR FORMATION HISTORY OF THE COMPLEX STELLAR SYSTEM TERZAN 5	6.00 HR
3	GS-2016A-Q-78	Oka	US	Phoenix	Probing the Galactic Center's Molecular Gas using H3+ and CO	42.60 HR
3	GS-2016A-Q-79	Miller	CA	GMOS-S	Globular Cluster Spectroscopy of dEs in the Local Volume (South)	9.89 HR
3	GS-2016A-Q-80	Howell	US	DSSI	Validation, Radius Determination, and Host Star Binarity of K2 Exoplanets	50.00 HR
3	GS-2016A-Q-81	Herczeg	US	GMOS-S	Accretion and the formation of very low mass objects (South)	5.20 HR
3	GS-2016A-Q-82	Fernandes Lopes Soares	BR	GMOS-S	Deciphering the star-formation scenario of the Sh2-296 nebula	3.60 HR
3	GS-2016A-Q-83	de Souza Angelo	BR	GMOS-S	Investigation of Galactic open cluster remnants: the cases of Ruprecht 31 and ESO 570-SC12	3.30 HR
3	GS-2016A-Q-84	Davidge	CA	Flamingos 2, GMOS-S	Carbon Star Signatures in Integrated Galaxy Light	34.60 HR
3	GS-2016A-Q-85	Cúneo	AR	GMOS-S	Chemical abundances of polluted visible component atmosphere in black hole binary systems (South)	2.70 HR
3	GS-2016A-Q-86	Carrasco	US	Flamingos 2, GMOS-S	Studying the matter distribution in the bimodal lensing group SA78-SA790	9.00 HR
3	GS-2016A-Q-87	Britt	US	GMOS-S	Spectroscopic evolution of a Black Hole X-ray Transient	41.00 HR
3	GS-2016A-Q-88	Bessiere	CL	GMOS-S	Are all high luminosity AGN triggered at the peaks of major, gas-rich mergers?	30.00 HR
4	GS-2016A-Q-89	Fang	US	GMOS-S	Spectroscopic observations of faint young stars in Orion nebula cluster	19.60 HR

Appendix E. Research Staff Effort

Tables E-1 and E-2 list the distribution of effort of staff who have research time allocated. Values are listed by fraction of effort, in the following ten categories. Tables are based on timecard data from 1-Dec-2015 to 30-Nov-2016.

- **night** - nighttime support of regular science operations
- **day** - daytime operations
  including queue coordination, routine Head of Science Operations duties, Gemini Science Archive operations, and unscheduled daytime work
- **inst** - instrument support
  including instrument maintenance, troubleshooting faults and responding to instrument quality issues, defining calibrations and checkouts, performing nonroutine instrument tests, and instrument documentation
- **user** - user support
  including direct program support, visiting observer support, response to Helpdesk, and regular semester activities to allocate programs
- **ops imp** - improvement work and small operations projects
- **res** – research
- **dev** - major development projects
  including instrument commissioning
- **trans** - transition projects
- **mgt** – management
- **other ops** - other operations, including scheduled non-project staff meetings, career development and training, and outreach activities

Staff Member	day	user	res	night	inst	other ops	dev	trans	ops imp	mgmt
Andersen, Morten	8%	5%	62%	8%	1%	15%	1%	0%	0%	0%
Angeloni, Rodolfo	9%	0%	74%	14%	1%	3%	0%	0%	0%	0%
Carrasco, Rodrigo	1%	4%	35%	12%	19%	29%	0%	0%	0%	0%
Conn, Blair*	28%	16%	27%	0%	0%	28%	0%	0%	1%	0%
Diaz, Ruben	2%	12%	14%	10%	14%	15%	34%	0%	0%	0%
Garrel, Vincent	16%	0%	8%	0%	59%	6%	11%	0%	0%	0%
Gimeno, German	17%	6%	13%	9%	37%	14%	4%	0%	0%	0%
Hayward, Thomas	10%	0%	19%	6%	0%	6%	0%	0%	58%	0%
Margheim, Steven	0%	5%	10%	5%	2%	56%	22%	0%	0%	0%
Miller, Bryan	19%	2%	38%	3%	0%	16%	0%	1%	21%	0%
Rantakyro, Fredrik	8%	5%	7%	20%	21%	32%	7%	0%	1%	0%
Rutten, Rene	9%	4%	2%	6%	0%	29%	4%	2%	4%	42%
Salinas, Ricardo	12%	2%	70%	10%	0%	5%	0%	0%	0%	0%
Sanmartim, David*	13%	0%	46%	15%	0%	26%	0%	0%	0%	0%
Schirmer, Michael	14%	14%	25%	7%	2%	3%	0%	0%	35%	0%
Sivo, Gaetano	26%	1%	11%	0%	23%	20%	10%	0%	8%	0%
Thomas-Osip, Joanna	0%	3%	4%	0%	0%	19%	0%	0%	3%	71%
Turner, James	0%	42%	19%	0%	0%	21%	0%	2%	14%	0%
Average	**11%**	**7%**	**27%**	**7%**	**10%**	**19%**	**5%**	**0%**	**8%**	**6%**

Table E-1: Gemini South

Staff Member	day	user	res	night	inst	otherops	dev	trans	opsimp	mgmt
Adamson, Andy	0%	0%	3%	0%	0%	1%	0%	4%	0%	92%
Chene, Andre-Nicolas	0%	8%	16%	0%	6%	16%	7%	0%	47%	0%
Chiboucas, Kristin	35%	9%	21%	4%	11%	9%	2%	0%	8%	0%
Geballe, Thomas	4%	7%	51%	22%	4%	10%	0%	0%	2%	0%
Gomez, Percy*	0%	23%	30%	13%	17%	12%	5%	0%	0%	0%
Guyon, Katherine*	9%	27%	5%	24%	9%	12%	8%	0%	7%	0%
Jorgensen, Inger	0%	0%	50%	0%	0%	1%	0%	12%	0%	37%
Kleinman, Atsuko N.	23%	2%	17%	4%	0%	12%	0%	43%	0%	0%
Kleinman, Scot	0%	0%	3%	0%	0%	1%	0%	0%	0%	96%
Labrie, Kathleen	1%	30%	14%	0%	0%	21%	5%	3%	26%	0%
Lai, Olivier*	0%	0%	41%	0%	5%	8%	46%	0%	0%	0%
Leggett, Sandra	20%	0%	40%	0%	0%	21%	0%	0%	0%	18%
Lemoine-Busserolle, Marie	30%	13%	25%	0%	13%	16%	0%	1%	1%	0%
Lundquist, Michael	8%	11%	47%	7%	2%	4%	21%	0%	1%	0%
Mason, Rachel*	1%	5%	27%	0%	0%	33%	3%	0%	31%	0%
Peck, Alison*	0%	31%	13%	0%	0%	3%	53%	0%	0%	0%
Petric, Andreea*	18%	17%	38%	2%	4%	2%	0%	0%	18%	0%
Scharwaechter, Julia*	6%	13%	22%	12%	14%	29%	2%	0%	3%	0%
Schwamb, Megan*	13%	15%	14%	20%	19%	20%	0%	0%	0%	0%
Shih, Hsin-Yi*	14%	7%	54%	7%	14%	2%	0%	0%	2%	0%
Simunovic, Mirko*	0%	0%	27%	0%	0%	73%	0%	0%	0%	0%
Stephens, Andrew	15%	14%	7%	11%	11%	9%	0%	1%	32%	0%
Trujillo, Chadwick*	0%	0%	30%	0%	1%	0%	0%	0%	0%	68%
Average	**9%**	**10%**	**26%**	**5%**	**6%**	**14%**	**7%**	**3%**	**8%**	**14%**

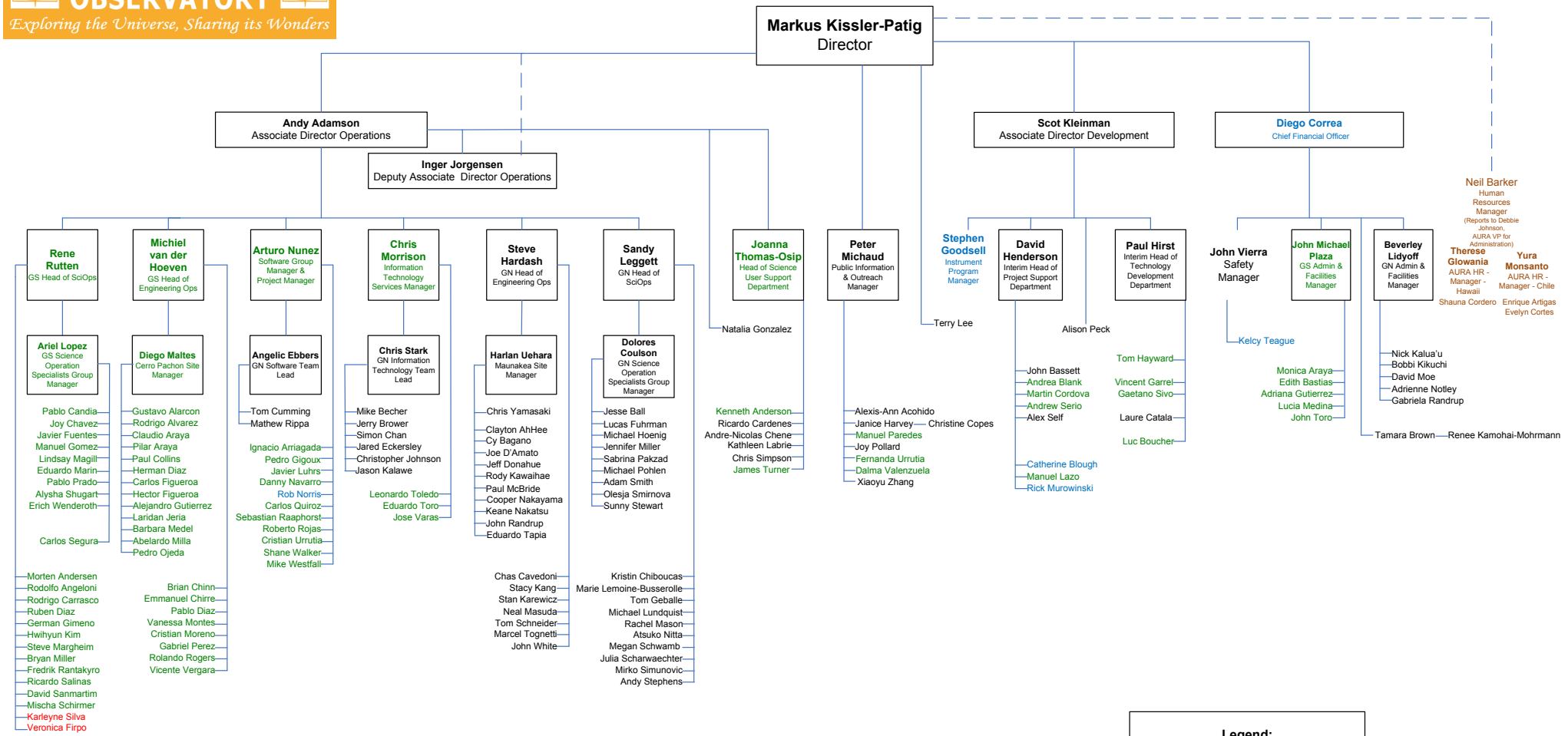
Table E-2: Gemini North

Appendix F. Organizational Chart

Significant organizational changes since the 2015 Annual report include (i) the creation of the Project Support Department, consolidating the previous Systems Engineering Department and project managers who previously reported directly to the AD for Development; (ii) the replacement of the AO and Telescope Development Department with Technology Development Department. Two temporary arrangements are in place pending recruitment of the Chief Scientist/Deputy Director: the Science User Support Department reports within Operations and PIO reports to the Director.

See the following page for the organizational chart.

Exploring the Universe, Sharing its Wonders



Legend:
Black = Gemini North Employees
Green = Gemini South Employees
Blue = Gemini Teleworkers
Bronze = AURA HR Support
Red = Long term visitors

Gemini Observatory

Effective as of December 1, 2016

Appendix G. Report Requirements

Guide to Locating Material According to Cooperative Agreement Terms and Conditions

Requirement	Description	Fulfillment
a.i	Summary of achievements, including a comparison of actual accomplishments versus goals	4,5; Appendix I
a.ii	Identification of problems faced, their solutions and impact on observatory operations	4,5
a.iii	List of observing programs, with their investigators, site visitors, observers, and hours devoted to each	Appendix D
a.iv	Report on the education and public outreach activities including non-scientific visitor statistics, press releases, etc.	6, Table 6-1
b.	Scientific accomplishments of the scientific staff, as well as their activities and expectations for the calendar year	Appendices B, E
c.	Technical accomplishments of each technical department, as well as the departments' expectations for the calendar year	4, 5, 8
d.	Listing of publications and reports produced by staff and, as far as possible, the users of the observatory	Appendices B, C
e.	Table showing the division of effort, adding up to 100 percent, for all scientific staff and/or Key Personnel among major activities, such as administration, visiting observer support, scientific research, etc.	Appendix E, Table E-1
f.	Chart or other description of Gemini's organization during the new program year together with an explanation for any changes from the previous year's organization	Appendix F
g.	Status report and plan for the new program year on the state of the Observatory	8
g.i	Scientific plans	8.2, 8.3, 8.4
g.ii	Detailed technical plans and the potential impact on the observatory of these plans	8.2, 8.3, 8.4
g.iii	Plans with schedules, milestones, and principal activities, for all major projects	8
g.iv	Estimated budgets for all major activities	8.1

Appendix H. Metrics

No.	Metric	Fulfillment	Target	Result			
				GN 2015B	GN 2016A	GS 2015B	GS 2016A
1	Telescope time use (per telescope, per semester), identifying fraction of time for science, weather loss, commissioning, telescope system faults, and instrument faults	4.7.1 Tables 4-4, 4-5 * See text for explanation of major downtime.	<4% fault loss	3%	3%	2.80%	1.50%
2	Over-subscription rate (per telescope, per semester)	4.7.2, Fig. 4-2		See Fig. 4-2			
3	Queue program completion fraction, by band (per telescope, per semester)	4.7, Fig. 4-1	Band 1 Complete: 75%	70%	77%	30%	22%
			Band 2 Complete: 60%	61%	74%	11%	26%
			Band 3 (started) at 75% complete	74%	68%	64%	50%
4	List of staff research and technical achievements, including prizes, awards, and invited talks	Appendix E					
5	List of staff technical achievements, including prizes, awards, and invited talks	Appendix K					
6	Number of peer-reviewed publications based on Gemini data	3.1, Appendix C	190/year	188 (72 based on GN, 92 based on GS; 24 based on combined observations from both)			
7	Number of peer-reviewed publications with Gemini Observatory staff as co-authors	Appendix B.1	20/year	28			

Appendix I. 2016Q3 Financial Report

See attached.

Appendix J. Completion of 2016 Program Plan

The original 2016 Program Plan is included here, excerpted for brevity, and annotated with specific comments on progress in blue. We do not list optional projects undertaken on a best-effort basis, nor do we list additional activities and accomplishments during 2016. The main report body provides more explanation of these activities.

J.1 Science and Engineering Operations in 2016

J.1.1 Regular Operations

Here we list regular operations items with specific developments within the year.

- Maintain the instruments and telescopes in working order consistent with the requested science time on sky; monitor performance and take remedial action as needed.
    - Remedial action on NIRI (cold heads, mechanisms) was completed. Remedial action on F-2 cold heads was completed. Remedial action on GMOS-S optics oil bubbles now planned for 2017.
- Run the International Time Allocation Committee (ITAC) process to combine the national TAC results into an executable queue and visitor program consistent with available time, conditions, and instrumentation.
    - ITAC chair duties passed to Rodrigo Carrasco (Gemini South).
- Provide web-based documentation suitable for PI reference on instrumentation, software and Observatory processes.
    - See Science User Support
- Support visiting instruments as needed and as possible.
    - Gemini South saw both DSSI and Phoenix as visiting instruments in 2016A.
    - GRACES saw significant use at Gemini North. See the run report web page for details[9].
    - Worked with the DSSI team to develop a more robust version of the instrument which may be possible to permanently mount on Gemini North. At the time of writing the instrument is in the build phase and we are discussing options for Gemini South.
- Propose and execute continual improvements in instrumentation, telescope, and enclosure to maintain performance levels.
    - Vibration monitoring equipment similar to that in the North is working well and being readied for installation on Gemini South. This requires a 2017 project in operations to complete. Once done, we will retrofit the computer and software to the North.

[9] http://www.gemini.edu/sciops/instruments/graces/status-and-availability/end-graces-schedule-block-report

- Provide expertise and input to the Development Division in carrying out major enhancements of instrumentation.
    - Done; various engineering and science input provided to multiple projects.
- Staff the "third" and final level of a helpdesk to respond to queries from the user community. (The first two levels are (i) NGOs and (ii) instrument specialists at the NGOs.)
    - Done with some changes in the detail, e.g. US support of cookbooks

J.1.2 Science and Engineering Operations Core Projects and Goals

Develop an Observatory-wide Obsolescence Mitigation Plan

- Initial plan was completed and submitted to NSF by August 2016. Details and timing are being worked on and will be complete by end of 2016.

Operations Software Upgrades and Obsolescence Management

- A prototype of a web-based user interface for the new sequence executor was completed in May. Progress on the execution engine was slower than planned due to resource unavailability during Q3. A first operational version of the system is now expected by Q2/2017.
- Due to staff availability, the TCC rewrite will begin once the Seqexec is complete, namely in 2017.
- RT Upgrades: We completed the consolidation of common software libraries for the real-time systems, with a final review in October. With this in place, the upgrade stage has started. We plan to complete the upgrade of the simpler systems (GWS, A&G Sequencer, GCAL) by end of 2016, as originally planned.

Science Operations Model Upgrade

- Prioritization document was in fact completed within Q3. A set of priorities were agreed with the Director and we are now working to fit them into the overall program.

Upgrade the Cerro Pachón Network Link

- Microwave connection was fully implemented and has been in reliable operation, adequate for base facility operations, for many months. We now expect the LSST fiber to become available in early 2017 so this item will recur in the 2017 program plan.

Commission the FLAMINGOS-2 MOS mode

- This remains to be completed. Work was completed on the On-Instrument Wavefront Sensor (OIWFS) on schedule, but subsequent weather issues and a new fault have so far prevented any progress on the MOS commissioning.

J.1.3 Science User Support Department in 2016

- Implement new post-observing communication strategy, including regular support for the Data Reduction User Forum, post-observing contact with PIs, and improvements to the regular support mechanism that the Helpdesk currently provides.
    - Technical and structural improvements (Q1)
        - completed

    - Utilize dedicated non-staff contributors to Forum (Q2)
        - completed
    - Implement post-observing contact with PIs (Q3)
        - delayed to 2017 in favor of starting project to develop new public web pages with user-centric navigation and structure
    - Define requirements for external Helpdesk (Q4)
        - completed
- Improve data reduction software documentation and cookbooks.
    - Evaluate inventory and cookbook template (Q1)
        - Cookbook template delayed to prioritize a successful advertisement campaign for the Data Reduction Users' Forum. This work to be completed in Q4.
    - Define specific plans for cookbooks and documentation (Q2)
        - completed
- Complete final imaging mode of QAP (GSAOI; Q1) and release to public (Q2).
    - completed except public release delayed to 2017 in order to provide software useful for scientific quality reduction
- Complete quick-look tool for quality assessment of spectroscopic observations (Q1).
    - completed
- With STScI, repackage the STScI- and Gemini-developed software within Ureka using Conda (Q2). Use of Conda will allow the user to stay more up-to-date with third-party Python packages such as numpy and matplotlib (among hundreds of others).
    - behind schedule; will be completed in Q4.
- Update Gemini IRAF for new GMOS-N Hamamatsu CCDs (Q3) and F2 MOS mode (Q4). This will be one of the last releases of Gemini IRAF.
    - The Gemini IRAF updates for GMOS-N and F2 MOS will be delayed into 2017 due to delays in commissioning of both modes.

J.2 Transition Program in 2016

Base Facility Operations at Gemini South

- Base facility operations started on scheduled in mid-November at Gemini South

GN Energy Savings

Execute large contracts: (A) related to the Gemini North Energy Audit; and (B) installation of HBF photovoltaic system.

(A) The following energy savings measures and replacements of cooling equipment are included in the energy-audit-related contract.

1. Lighting and energy management systems improvements, including replacement of HBF and MK lighting with LEDs
2. Installation of fluid cooler (Maunakea)
3. Replacement of transformers with premium efficiency models
4. Installation of variable frequency drive pump (Maunakea)
5. Replacement of Maunakea chiller
6. HBF HVAC upgrades and replacements

- (A) The contract for implementation of the content of the Gemini North Energy Audit was about 4 months behind schedule in October, due to delays on the contractor's side involving late start of engineering design, delays in hiring contractors, and delays in providing work schedule for the major components. We have taken action to pull out of the current contract as agreed with the contractor. We will complete the remaining work with smaller direct contracts. This construction work will go into 2017. We expect to realize $85k out of the total planned $193k non-labor savings from the project by the end of 2016. The delay in realizing the rest of the savings has been taken into account in the 2017 budget.

We provide an overview of the work here.

Energy Conservation Measures	ECM #s	Status	Main reasons for implementation
Lighting at HBF & MK	1,2,3	Expected complete by end of Dec 2016 (6 month delay, plus missed incentive funds of $4.4k)	Energy savings; eliminate mercury in CFL lights.
HBF energy management	4	Will be descoped.	Energy savings
Step down transformers	8	HBF + MK install complete by mid-September (2.5 month delay)	Energy savings
MK fluid cooler	5	100% engineering design is in place. Requests for county permits submitted. Fluid cooler and Chiller purchased. Construction to be under separate contract.	Energy savings; enable cheaper solution on replacement of aging chiller.
Pump – variable frequency drive	9		Energy savings
MK chiller replacement	6		Replace aging equipment; meet Federal requirements to phase out HCFC-22 refrigerant.
HVAC upgrades (HBF)	7	100% engineering design is in place. Requests for county permitssubmitted. Construction to be under separate contract.	Replace aging equipment; meet Federal requirements to phase out HCFC-22 refrigerant.

(B) Our contractor has finalized the design of the 100kW HBF photovoltaic system and has submitted it to the County of Hawaii for a building permit. We expect construction to start in early February and complete by mid-2016, weather and inspections permitting.

- (B) The HBF photovoltaic system was completed in July 2016.

GS Energy Savings

Install 200kW+ photovoltaic system at Cerro Pachón (Q3, weather and inspections permitting).

- The CP photovoltaic system was completed in July 2016.

Reduce Base facility Expenses

Modify SBF to create 15 offices and new lab space. Vacate Casa 8 and reduce usage of Casa Verde. (Q3)

- Construction and furnishing as well as move to the new office space was completed in early December.

J.3 Instrumentation and Facility Development in 2016

Principal projects are listed in the table below.

Project	2016 Plan
GHOST	● Start Build Phase ○ Done May 2016
Gen4#3	● Start contract negotiations with selected teams ○ Released RfP in May, 2016. Proposals received in August; submitted section report to Board subcommittee in October.
GeMS Laser	● Select and complete contract for purchase ● Start work for necessary internal modifications for new laser ○ Done. Vendor contract signed in Q1. Internal work proceeding. Vendor delivery expected by end of year.
GMOS CCDs	● Install and commission new CCDs into GMOS-N ○ GMOS-N installation delayed due to technical problems with the "duplicated" components from the GMOS-S installation. We resolved all technical issues by May 2016 and are testing the science CCDS in October, for installation in early 2017.
Instrument Upgrades	● Select and begin project(s) from 2015 call ● Launch 2016 call with expanded budget ○ The 2016 project is underway and we released the RfP for the 2017 projects in September 2016.
NGS2	● Receive, install and commission NGS2 ○ Project delayed. Descoped acceptance testing planned for December 2016 with plans for further work to be evaluated afterward.

The high priority projects for Development and their planned activities in 2016.

J.4 Administration & Facilities and Safety in 2016

J.4.1 Finance and Administration

Budgetary responsibility

Finish 2016 within [-2%; +3%] of the requested O&M Budget ($27.30M). Continue to promote the accountability among the budget account managers.

- Training on financial planning and the Gemini budget system CONTROL was delivered to Gemini managers in Q1-2016 and Q3-2016. The 2016 budget and Forecast analysis presented in the table below show a net value in 2016 budget changes of $0 (Zero USD$) and the 2016 budget is expected to be spent within the [-1%, 2%] range.

in $ 000	2016 Budget	2016 Forecast	Var 2016 Budget vs. Forecast$	Var 2016 Budget vs. Forecast %
Salaries	12,869,409	12,429,645	(439,764)	-3.5%
Benefits	4,441,007	4,321,789	(119,218)	-2.8%
Temporary	429,216	569,386	140,170	24.6%
Total Labor	**17,739,633**	**17,320,821**	**(418,812)**	**-2.4%**
Supplies Equipment	1,089,041	1,322,320	233,279	17.6%
Travel	952,791	978,974	26,183	2.7%
Recruiting Relocation	58,000	58,000	-	-
Professional Fees	1,531,005	1,545,497	14,492	0.9%
Meeting, Conf., Prof Dev.	311,833	314,053	2,220	0.7%
Computer SW. and Equip	539,854	612,314	72,460	11.8%
Facilities	649,134	646,124	(3,010)	-0.5%
Maintenance	182,069	182,069	-	-
Utilities	1,298,602	1,258,802	(39,800)	-3.2%
Meals and Lodging	366,694	410,494	43,800	10.7%
Total Site Costs	2,496,498	2,497,488	990	0.0%
Spares	370,810	247,539	(123,271)	-49.8%
Other	502,036	(8,712)	(510,748)	5862.9%
Indirect Costs	986,169	836,169	(150,000)	-17.9%
Subcontracts	614,829	1,091,972	477,143	43.7%
Total Non-Cap. Exp.	**27,192,500**	**26,816,435**	**(376,065)**	**-1.4%**
General	107,500	483,565	376,065	77.8%
Total Cap. Exp.	107,500	483,565	376,065	77.8%
Total Non-Labor Exp.	**9,560,367**	**9,979,179**	**418,812**	**4.2%**
TOTAL EXPENDITURES	**27,300,000**	**27,300,000**	**0**	**0.0%**

Integration of Shared Services

Support strong partnership with AURA CAS and other Administration and Facilities services providers (NOAO-S and MKSS) With CAS, identify risks and their mitigation in the domain of accounting and contracting. Review and revise the NOAO-S Service Level Agreements for 2017 in view of BFO and power savings.

- Active participation in NOAO-S and MKSS Oversight Committees (no participation in the CAS/HR oversight)
- Increasing budget of NOAO-S for FY2016 of $150k to support Chile facilities' infrastructure improvements
- MKSS increasing shared fee of $32k for FY2016-2017 to offset decreasing lodge & meals fees
- Additional CAS and HR staff to cause increasing FY 2017 fees of $50K
- Gemini is participating on the NOAO-S FO (NOAO-S Facilities Operations) working groups that will review ad update the Service Level Agreements
- Gemini is working jointly with other AURA centers on the BSR Working groups that aim at unifying business systems, practices and procedures.
- Gemini, CAS and HR are working jointly on the plan of the coming Business Systems review of the Gemini Observatory that NSF will conduct in early 2017.

Instrument Development Fund management

Develop a long term Instrumentation reporting system that meets IDF reporting needs of management, governance, and future Partners.

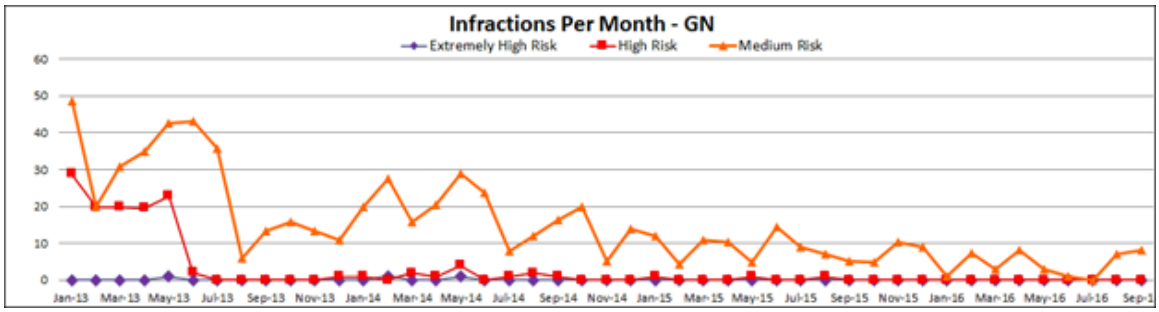
- New reports created in 2016 to track IDF's current and future spending of instrumentation projects. Ongoing efforts to develop financial reports to track IDF contributions by project.

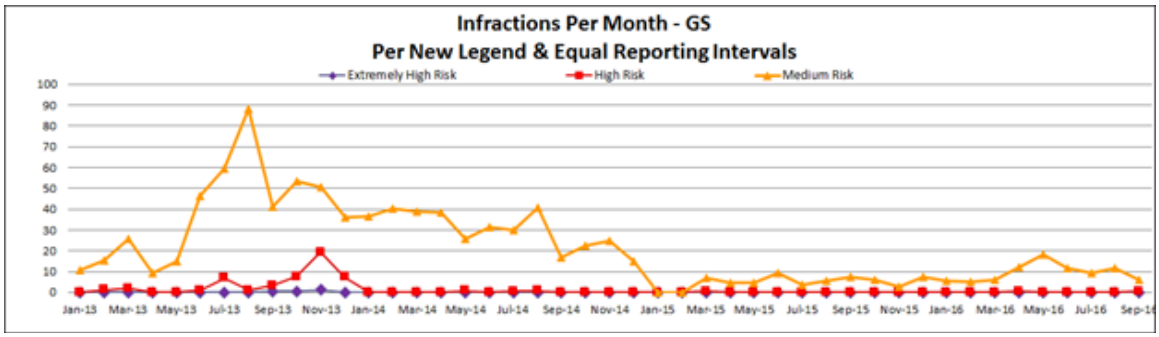
J.4.2 Safety

Staff Safety

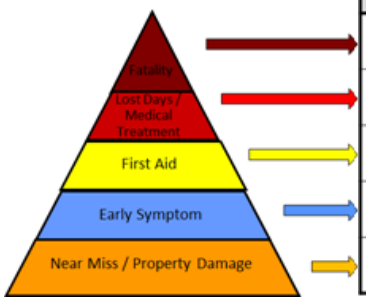
Continue delivering Safety standards and services at the highest level, and meet the goal of an observatory-wide 90% completion of the mandatory safety training.

- Goal: *Mitigate Gemini's driving/speeding high risk*.
  High risk driving violations are nil and the following charts depict the decreasing trend of speeding violations in Gemini North and Gemini South for the period Jan 2013 to Sep 2016:



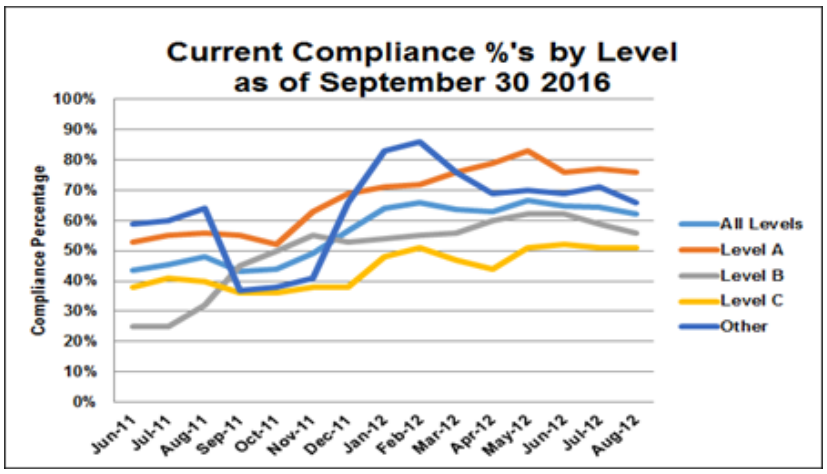


- Goal: *Minimize the number of Safety incidents and time lost*
  Time lost in 2016 is zero; the chart below shows the decreasing trend of safety incidents and lost days since 2012 to date:



YTD 2016		2015		2014		2013		2012		2011	
Cases	Lost Days	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days
0	0	0	0	0	0	0		0		0	
1	0	2	5.5	1	7	2	28	2	185	0	0
6	0	3	0	1		1		6		0	
0	0	1	0	1	0	0		1		0	
2	0	6	0	7	0	3		5		12	

- Goal: *Achieve a training ratio of 90% in 2016*.
  Gemini has achieved an Observatory-wide completion of the mandatory safety training of 78% as of September 30, 2016. The following graph shows the increasing trend of safety training completed by all Gemini staff:



Safety operations and Management structure

Implement long-term Safety operations and management structure around the synergies with Maunakea and Cerro Tololo/Cerro Pachón partner telescopes.

- Throughout 2016 the Safety team has been working on a long-term Safety operations and management structure around the synergies with Cerro Tololo/Cerro Pachón partner telescopes. Safety resources were initially shared with LSST in the South and after the transfer of the Safety Coordinator to LSST in August 2016, the Safety department has been restructured. We are recruiting a Safety Specialist for Gemini South, and retained the staffing services of an Admin Safety officer until December 31, 2017. Ongoing joint training efforts and sharing of Safety resources are ongoing with Maunakea telescopes.

J.5 Public Information and Outreach in 2016

We will continue our regular local outreach programming, including Journey Through the Universe (JTTU), Viaje, AstroDay, StarLab, media relations, publications, user communications support, library services, and science result tracking.

- JTTU was completed, with significant changes to program based on input from

teachers and Department of Education administrators. (100% completed)
- Viaje was implemented in late October, on schedule. (100% completed)
- Media relations are on-track and 12 press releases were produced exceeding our minimum goal of 8. (150% completed)
- Publications are all either on schedule or published. (100% completed)
- All other items are on target. (100% completed)

We also identify the following specific activities to complete in 2016.

- Unify user communications at both sites by introducing regular processes and balance quantity of content for users and the public.
    - Implemented 50:50 social media posts (50% user, 50% public and of these 50% for each site) and tracking is now part of normal operations. (100% completed)
- Expand media relations resources and public relations capabilities, with annual public information internship (beginning Q3 - hired through March 2017) and limited-term (2-year), entry-level, public information assistant position (beginning Q1 - hired, as 3-year position). Continue limited engagement in Maunakea/TMT and related crisis communications, including ongoing dissemination of information to key stakeholders. (100% completed)
    - Activities related to Maunakea and TMT are reduced due to delayed court proceedings, but supporting "Envision Maunakea" initiative with commitment to assist in communications effort.
- Complete integration of common outreach objectives for core Gemini South outreach programming. Transition StarLab in Chile to "train and loan" model (as done in Hawaii) by June. (100% completed)
    - StarLab training and loan program established at GS, Viaje al Universo formal implementation plan developed in alignment with Journey Through the Universe program at GN
- Complete addition of eight new staff profiles in Career Brochure and post video interviews on companion website (Q2). Produce a minimum of four additional 8.5x11" in-depth profile sheets (Q2). (90% completed as of November 30, 2016, on track for 100% completion by end of 2016)
    - New versions of career brochures (English and Spanish) completed with two 8.5" by 11" in-depth sheets complete; remaining sheets will be completed by the end of the year.
- Complete tablet-based virtual tour production and install in both Gemini lobbies (Q3).
    - In production at GS; GN content almost complete, 80% at end of November, will be 90% completed by end of 2016.
- Develop and implement new publication tracking procedures that include improved data on archival use of Gemini data (Q2). 100% completed
    - Completed by library staff

J.6 Gemini External Relations in 2016

- North American institutional visits: Director Road Trip for general information about Gemini's new operations, instruments, and opportunities (Q1; completed late Aug/early Sept); Development Road Trip with focus on instrument-building institutions (Q3; cancelled)
- Directorate attendance at Partner national astronomy meetings
    - Several members attended the American Astronomical Society meeting in

January 2016. The Deputy Director attended SOCHIAS in March, Director attended CASCA in June, Deputy Director attended SAB in August, and Assoc. Director for Operations attended AAA in September

- Support Gemini Board in development of strategic vision exercise
    - Ongoing, report to be delivered at the November 2016 Gemini Board meeting
- Lead the development of memoranda of understanding with any new limited-term Partners
    - Agreements signed with KASI (for 2017 & 2018) and AAL (for 2017)

Appendix K. Staff Accomplishments

K.1 AURA Awards

- The 2016 AURA Science Award went to Rachel Mason, tenured associate astronomer, and Jared Eckersley, web applications developer, for the creation of Gemini's Fast Turnaround Program. Fast Turnaround (FT) utilizes peer review to enable a community scientist to go from an idea to delivered data in as little as one month. Currently up to 10% of Gemini observing time may be distributed through this mode.

- The 2016 AURA Service Award went to John Michael Plaza, Gemini South Administration and Facilities Manager, for consistently meeting and managing the service expectations of Gemini's staff and following through on commitments accurately and in a timely manner.

- The 2016 AURA Technology/Innovation Award went to Paul Hirst, observatory scientist, for envisioning, designing and implementing the new cloud-based Gemini Observatory Archive. The new archive uses Cloud-based data storage (purchased from Amazon Web Services) and interfaces live with our observing software at the two telescope sites. New data are transferred in real time and made available to the users within minutes of being obtained.

K.2 Invited Talks

André-Nicolas Chené

" Massive infrared clusters in the Milky Way", at the IAU Symposium 329: The Lives and Death-Throes of Massive Stars, Auklan, New-Zealand (November 30, 2016).

Tom Geballe

"Observations of Ices in the Galactic Center: Past, Present, and JWST-Future," at Leiden University / "Ice Age - The Era of the James Webb Space Telescope" at Leiden, The Netherlands, (October 7, 2016)

Atsuko Nitta Kleinman

"From Theoretical Particle Physics to Observational Astrophysics" at the Final Lecture Series on Prof. Akio Sugamoto's Retirement, Ochanomizu University, Tokyo, Japan (March 05, 2016)

Megan Schwamb

“Planet Four and Planet Four: Terrains,” Our Red Planet Workshop, Greenbelt, Maryland, USA (September 20, 2016).

“Colours of the Outer Solar System Origins Survey (Col-OSSOS): New Insights into Kuiper belt Surfaces,” AGU, San Francisco, USA (December 15, 2016).

Gaetano Sivo

"Wide-field Adaptive Optics for Astronomical Ground-based Telescopes: Science Results and Ongoing Upgrades for GeMS", at the Optical Society of America conference, Heidelberg, Germany, July, 27, 2016.

K.3 Special Accomplishments

Atsuko Nitta Kleinman

Listed in "The World's Most Influential Scientific Minds 2015" by Thomson Reuters.