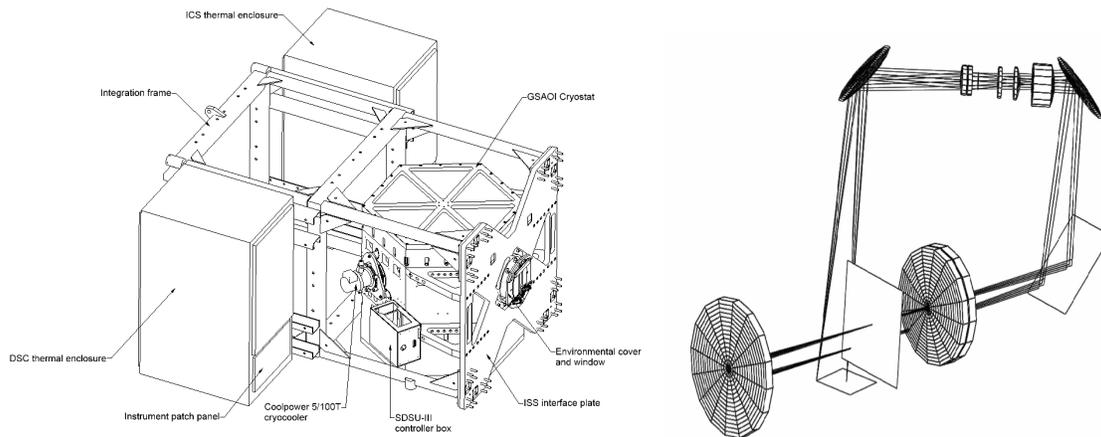


## GSAOI

### Description

GSAOI is a NIR camera, covering the spectral range 0.9–2.4  $\mu\text{m}$ , and samples a field of 85" x 85" at 0.02"/pixel. GSAOI is the primary imaging instrument designed for GeMS, and is fed by the Canopus f/33 AO corrected beam. Canopus is the GeMS multi-conjugate adaptive optic system, which provides a corrected wavefront to other instruments.



### Components

Focal Plane field mask (after cryostat window).

Field lens doublet.

First element of the optical relay. Inside the relay there is an internal cold stop.

Filter wheels: (2)

- Two of each: dark, diffuser, Hartmann, plus the open apertures.
- 15 slots each, 22 filters available.

Broad band Filter	Central $\lambda$ ( $\mu\text{m}$ )	Narrow band Filter	Central $\lambda$ ( $\mu\text{m}$ )	Narrow band Filter	Central $\lambda$ ( $\mu\text{m}$ )
Z	1.015	He I	1.083	He I (2p2s)	2.058
J	1.250	H I P $\gamma$	1.094	H <sub>2</sub> 1-0 S(1)	2.122
H	1.635	H I P $\beta$	1.282	H I Br $\gamma$	2.166
K'	2.120	[Fe II]	1.644	H <sub>2</sub> 2-1 S(1)	2.248
Ks	2.150	CH <sub>4</sub> (short)	1.580	CO $\Delta v=2$	2.360
K	2.200	CH <sub>4</sub> (long)	1.690	H <sub>2</sub> O	2.000
		J cont.	1.207	Ks cont.	2.093
		H cont.	1.570	KI cont.	2.270

## GSAOI

- The filters are placed in a non-collimated region located in front of the cold stop.

The last three elements of the optical relay follow, the resulting magnification: 0.708 (the focal length of the telescope plus Canopus is 262.2 m). The optical system is non-telecentric to minimize reflections and ghosting.

Utility wheel: (4 slots)

- Open aperture.
- Pupil viewer for instrument/Canopus alignment (background minimization).
- Convex defocusing lens for determination of non-common path wavefront error between Canopus and GSAOI.
- Concave defocusing lens, for the same purpose as above.

Hawaii-2RG detector mosaic: 4 x 2048 x 2048, QE ~ 80%. 2.5" gaps between detectors.

### **Science operations**

GSAOI started regular queue operations on 2013A, and it has been reliably operating, however its use is subject to the availability of the GeMS Laser + AO correction system.

Semester	Demand (% *)	Inst. allocation (% of total assigned)	Observed hours**	Hours lost to fault
2014B	9	5	62.8	0.00
2015A	15	8	62.2	0.05
2015B	5	6	0.0	-
2016A	10	10	22.6	0.00

\* Fraction of total hours requested in all proposals received for the semester, per telescope.

\*\* Approximate on-sky use.

### **Modes pending commissioning**

Each detector has programmable On-Detector Guide Window (ODGW) that could be used as natural guide star tip-tilt wavefront sensor for Canopus (unplanned).

### **Upgrades**

Detector upgrade, to replace one in the mosaic that has significant defects (under consideration).