IGRINS-2 SV Observation Evaluation Form

Title: Surface Magnetic Fields and Line Profile Variability in Rapidly Oscillating, Magnetic Chemically Peculiar Stars
Program ID: GN-2024A-SV108
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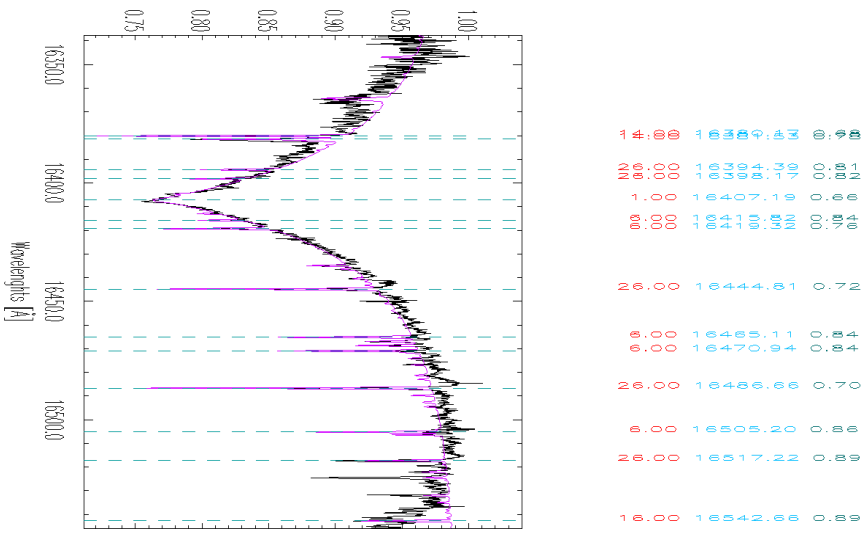
Description of the primary goals and the main findings

We observed the very bright magnetically Chemically Peculiar (MCP) star, HD 176232 (A7Vp; K=5.3), with the goal of determining the strength of the surface magnetic fields using the strengths, widths, and profiles of magnetically sensitive absorption lines (primarily those of Fe) in the H band. The target star is also known to exhibit variations in the profiles of optical lines, due to pulsations, with a period of about 12 min. By observing the star repeatedly in the NIR with very short exposures (on the order of only 10 sec) over two periods each, we should be able to characterize the gas dynamics in the atmospheric layers of these stars that give rise to the NIR absorption lines.

A large number of lines are detected in the spectrum, some of which have not been identified. The H absorption lines are generally well-matched with a synthetic spectrum generated for the assumed effective temperature. We are in the process of estimating abundances and magnetic field strengths.



Combined IGRINS-2 spectrum of HD17232 in a single order. The purple line is a synthetic model. The H line is well reproduced. Some strong absorption features have not yet been identified.

Additional comments on IGRINS-2 performance:

Results of any other IGRINS-2 capability tested and comparison with other instruments

The instrument produces spectra for which the intensities in successive orders do not match at the wavelengths where they overlap. Furthermore, the spectra in the individual orders exhibit unphysical slopes. Fortunately, for this program we needed only normalized spectra, and were able to fit a smooth curve to each order to do so.

Suggestions for improvements:

Any comments on ITC, PIT, OT, data reduction pipeline, website, archive, etc…

The pipeline reduction worked reasonably well. However, the telluric correction provided by the pipeline was insufficient for our purposes, as it left a large number of very strong residuals in the spectra which hindered line identifications and measurements. We developed our own telluric correction code to overcome this shortcoming.

Any additional comments about IGRINS-2 SV

Having the opportunity to use IGRINS-2 and reduce data with the pipeline was greatly appreciated. However, I feel there was far too much emphasis on the science that could come out of the SV observations and not enough of a focus on the instrument, the various tools, and data reduction pipeline, and how each of these elements performed. The SV effort should not be centered on the science that can be done, in my opinion, but rather on whether everything in the system is working well and as expected. In the case of IGRINS-2, I have found that the instrument is definitely not behaving as it should.