Monthly Status Report
Prime Focus Imaging Spectrograph
August 2002

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Optics

• Finished writing and released RFP for opto-mechanical engineering consultant. Responses are due 15 Sept.

• Determined specification and sent out RFQ for folding flat mirror.

• Wrote SPIE conference presentations. PowerPoint versions are available at http://www.sal.wisc.edu/PFIS/docs/html/documents/talks.html

• Attended SPIE conference
- spoke with DEIMOS removable element people about slitmask operations
- spoke with Bruce Bigelow, Alan Schier (prospective optomechanical consultants)
- visited Gemini slitmask machine at Hilo and spoke with John Hamilton (hardware) and Inger Jorgenson (software). It looks like we will be able to copy much of their facility, and save substantial money by integrating the components ourselves, rather than going through a third-party contractor.

• A new concern has arisen over the birefringence of the elements before the polarizing beam-splitter. Induced birefringence with an optic axis not aligned with the E and O beam electric vector will cause an effective depolarization of the beam. Affected by this are the collimator refractive elements (stress birefringence in the fused silica, CaF_2, and NaCl) and the dispersors (stress birefringence in Fabry-Perot etalons and diffraction birefringence in the VPH gratings). The fused silica and CaF_2 do not appear to be a problem, and measurement of one of the ICOS 150mm etalons at UW shows an acceptable depolarization. The one NaCl element appears to be the most serious problem - it may require selecting for low stress. A possible phase delay induced by the VPH gratings (suggested by Jaap Tinbergen at the SPIE conference) is under investigation; if this is a problem it can be mitigated by orienting the E and O beams at 0 and 90 degrees to the grating axis, at the expense of unequal beams, and a resulting loss of S/N for polarimetry.

Mechanical

• The design of the Grating Mechanism has been completed after a few changes to the grating size and positioning method were made. These changes will allow grating angles up to 50 degrees, which will give a resolution of 5300 through a 1.25 arcsec slit. FEA analysis was undertaken to determine the mechanism flexure and hence the clearances required for sliding parts.

• The design of the Articulation Mechanism has begun. At this stage we are identifying (and doing some minor testing on) parts for the major components such as the articulation bearing,

the track roller and the drive system.

• Time was also spent over the last month testing the hysteresis and repeatability of various end position sensors with the intention of identifying a group of sensors we could standardize on for the majority of mechanisms.

• Followed up on an outstanding issue with the encoding of the wave plate rotation: We have found a company that will be able to develop an encoding disk that can fit around the wave plate optic and hence facilitate direct encoding of the rotation angle, a simpler and more accurate solution.

• We have engaged in discussion with a local engineering consulting company about the possibility of assisting us by doing the manufacturing level drafting and giving us advice on the best practice for having each of the components fabricated.

Control

• Specified the "generic mechanism" (laboratory setup to aid in testing control software for the PFIS mechanisms) with detail sufficient for the instrument maker to proceed with fabrication.

• Procured parts for the generic mechanism.

• Coordinated electrical engineer and technician on wiring diagram and electronic fabrication for the generic mechanism.

• Produced a detailed mechanism control interlock specification (SALT-3140AE0015, http://www.sal.wisc.edu/PFIS/docs/html/subsystems/3140.html)

• Explored and refined the high level observation control concept. We have decided that the high level observing modes will be implemented by high-level LabView Virtual Instruments ("VI's") rather than by a separate scripting language, which would be difficult to implement in the LabView environment. Observations will be initialized by an observing parameter file defined in the Phase II of proposal acceptance, which will be loaded into an observing definition VI, which in turn loads the observing parameters. The SA will then start the observation by activating the appropriate observing mode VI. The instrument will implement an ascii-based command set compatible with the observatory command server plan as we currently understand it, but it will not be used to sequence the high-level observing sequences.

• Worked on mechanism-level wiring diagrams.

Management

• Began revising the budget with detailed capital item price information based on mechanical engineering so far.

Activities for the next month

- Mechanism designs:
  - finish articulation mechanism design
  - award manufacturing drafting contract
- Optics
  - award optomechanical consultant contract; schedule kickoff meeting
  - order fold flat
  - finish blank birefringence investigation
- Control
  - set up generic mechanism lab
  - Labview client-server design
- Detectors
  - ICD and Statement of Work update
- Management
  - Assemble data for Q3 2002 Quarterly Report