DEIMOS
SSC Presentation: March 9, 1998
Fifteenth Quarter

Optics:

- The CaF_2 blank for Element 3 was received from Optovac. The diameter was reduced from 15.0-in to 13.6-in, costing at most a 2% light loss (in spectroscopy mode.)
- A coating bid was received from Coherent, Inc., for $139 K to coat the camera optics, $100 K over budget. We hope to rescope and negotiate down to $115 K. Coating is scheduled for June with a one-month turnaround.
- Status of the camera elements:
  - Elements 2,5,7,8, 9 and the dewar window are complete.
  - The asphere on Element 1 is expected by March 20. CHOPPY will be 2 $\times$ spec. This is OK.
  - The front side of Element 6 is finished; the backside sphere is waiting as the final pickup surface.
  - Elements 3 and 4 (all spherical surfaces) should start March 20.
  - **Major Milestone:** Completion of the camera optics on Jun 1.
- The optical error budget forecasts average rms image diameters of $\sim 0\farcs26$ for both spectroscopic and direct imaging (including telescope astigmatism).

Camera Cell:

- The Camera Critical Design Review was held Nov. 14. The review was generally favorable except for the barrel mechanical design, which was criticized as too complicated. The design was simplified, and final drawings are in hand.
- Stainless steel barrel element No. 1 was rough machined and heat-treated; it was dimensionally stable and round to 0.001-in. The alignment procedure for mounting lenses in barrels will be tested using this element when completed.
- The plate-scale athermalization scheme looks very workable.
- Five candidate optical coupling fluids are now in reactivity tests with RTV560, O-ring candidates, bladder vinyls, and mylar.
- Thermal records of the Keck 1 and Keck 2 domes were analyzed to determine mean DEIMOS camera operating temperature and excursions. A report is available.

Structure/Mechanical:

- **Major Milestone:** "Instrument Assembly" July 1, 1998. Group One subsystems installed and ready for final testing on that date (see attachment).
- Grating subsystem: The No. 1 grating 1 slider and cell are complete. The slide/counterweight drive and the air-driven mounting hardware are complete. The mirror slider is being designed. **Major Milestone:** The grating slider drive with Grating 1 is undergoing first tests today; flexure tests are expected next week.
- PA drive: Renashaw experiments still seek to read over gap with single read head. Extra read head on order. Install Apr 30.
- Collimator: Cell complete; mirror aluminized and waiting. Install Jun 1.
- Tent mirror: Tabs need gluing. Install Jun 15.
- FC focal plane fiber feed: Fibers are here. Need to design and fabricate fiber insertion points in slitmask mandrel. Install Jun 15.
- Cable wrap and take-up: In fabrication. Install July 1.

- Filter wheel: Design starts Apr 15. May send out for fabrication. Install July 1.
- Measurments show that DEIMOS' black paint is really black at both 2μ and 10μ. Will send out for optical tests at 1μ.
- Thermal analysis predicts internal temperature differences within DEIMOS' enclosure of $< 0.2\ ^\circ$C. Meets specification.

Dewar:
- Dewar mechanical design is complete.
- The dewar aluminum can has been fabricated.
- The focus and FC X-stage drives have been fabricated.
- The LN_2 can should be finished this week.
- Dewar mechanical integration, cooling, drive, and leak tests are due by Apr 15.

Detector/Mosaic/Controller:
- **Major Milestone:** An Orbit CCD has been read out with the FC controller in the ESI dewar. This is the first CCD readout with the Leach-2 controller.
- **Major Milestone:** A goal is to read out 2 Orbit CCDs with the FC controller in the test dewar by Apr 15. This will be the first time that Lick has run multiple CCDs in the same dewar. This exercise will test cross-talk, dewar cabling design, and location of the preamps (presently outside the dewar).
- The mosaic assembly process has been designed, and prototype CCD handling jigs and fixtures are being tested. The schedule allows for two dummy practice assembly runs.
- **Major Milestone:** The target date for assembling the real Orbit CCD mosaic is Jun 30.
- Mosaic cooling tests we are complete; show no detectable motions on thermal cycling ($< 5\mu$).
- The brick wall pattern is much reduced (from 20% to 7% at 4000 Å) on the new MITLL high-rho devices. However, we have not yet received a normal epi device (which is what DEIMOS has mainly ordered).
- The performance of an interim single-layer HfO AR coating is excellent; QE is now 60% (up from 25%) at 4000 Å. Reports are that the real 2-layer AR coating is also excellent.
- The first half of our epi run has been run at MITLL. Wafer-probe imaging tests should be available in 10 days. In addition to the second half of this run we also have a half-half run of high-rho devices coming later.
- **Major Milestone:** The target date for receiving 8 good MITLL epi CCDs is Aug 1. The barrier will be packaging at MITLL.
- A theoretical CCD fringing model has been started in hopes of removing fringes without the need for flatfields at each grating setting.

Control Electronics:
- The motor control mounting boxes for the ring at the rear of DEIMOS have been designed, and the mounting racks have been installed. One unit has been fabricated and the other is in progress.
- A universal motor mounting module has been designed and many copies fabricated.
- The cable plug-in unit that connects the cable wrap to the outside world has been designed.
- A prototype thermal sensor system has been tested. Sensors will be matched to better than $< 0.05\ ^\circ$C. Thirty sensors are on order.

Software/Computers:
- The instrument computer, a Sun Ultra Enterprise 450, was donated by Sun Microsystems (thanks to Marc Davis). Value to the project = \$33,000.

- Software tools “dashboard” and “codegen” were written to allow rapid development of GUI and motor control software.
- The instrument simulator, “ksim,” was completed.
- A prototype GUI was built using dashboard and ksim. This was previewed on GUI Day December 16, 1997, to rave reviews. GUI development is ahead of schedule.
- Figdisp modifications are complete. Figdisp operates on all Unix platforms and is ready to support lab testing. We are now turning to absorbing the NOAO mosaic RTD and message-bus system.
- Additions continue to the Keyword Database. In addition to the keyword definitions, the DB also contains user-friendly help files and basic information on the pedigree and history of the keyword parameters.

Schedule and Budget:
- A major analysis of schedule and budget have been carried out (see attached).
- Target shipping date: March 1999
  Target end of commissioning: June 1999
- Estimated cost overruns:
  - Manpower: $366 K
  - Materials: $216 K
  - Contingency: $79 K
  - Net overrun: $503 K
- Dates to watch:
  - Apr 30: Cross-talk tests complete on two CCDs
  - Apr 30: Complete tests of grating drive/mount/flexure.
  - Jun 1: Camera optics completion
  - Jul 1: Camera optics coated
  - Jul 1: Instrument assembly, Group one subsystems
  - Aug 15: Orbit mosaic and dewar ready for spectrograph
  - Aug 21: Camera and dewar in spectrograph

Concerns:
- Breakage of CaF_2 in coating.
- Intractable cross-talk or other problems in mosaic signal chain; inability of the Leach-2 controller to operate 8 or 16 amplifiers.
- Grating mount scheme doesn't work and/or gratings flex.
- Budget and schedule overruns (especially budget).