

Keck Science Meeting

- Logistics
 - Hosted by UC Berkeley at the Bancroft Hotel
 - October 15-16, 2010 [Science, Strategic]
- Science
 - SOC:
 - Marcy (UCB), TBD (Caltech), Liu (UH), Beichmann (NASA)
 - Aim for broad areas that include full Keck community
- Ideas for the Strategic Day
 - Reminder of the Keck Scientific Strategic Plan
 - Reactions to the Decadal Report
 - Panel discussion on Keck's role in the US community
 - Discussion on Keck's role vis-a-vis TMT
 - Presentations from the successful White Paper teams

LRIS High Resolution Upgrade

- Science Motivation
 - High resolution spectroscopy of crowded fields: globular clusters, galaxies, Galactic bulge
 - Abundances, stellar populations, kinematics
 - Competition: FLAMES and GIRAFFE (VLT), Hectochelle (MMT)
 - Future capabilities: PEPSI (LBT), Hermes (??), WFMOS
 - Keck advantage: >1 mag deeper sensitivity
- Options Considered
 - HIRES would require a new collimator for wide field
 - DEIMOS has insufficient space to accommodate required gratings (?)
 - LRIS can be equipped with a double-VPH tent grating module
- LRIS VPH option
 - 2 VPH gratings in a tent configuration can provide $R \sim 18,000$ with 0.4-0.5 arcsec slits
 - ~ 10 gratings required to cover 4000-10,000Å

LRIS High Resolution Upgrade

- Advantages
 - No moving parts (except jukebox)
 - Modest cost (~1M\$)
 - Retains LRIS field of view
- Disadvantages
 - Slit loss ~50%, may require slit mill upgrade
 - Unique grating for each band ~10% of optical band coverage – 1 per night plus day-time grating swaps or complex jukebox
 - Requires cutting a hole in LRIS support structure, may require both significant compensating mechanical design and rework.
 - Significant down time for LRIS for rework
 - Red camera may not have sufficient image quality to provide required resolution
- Proposed Engineering Test
 - Chris Clemens provides 2 VPH gratings at no cost
 - Temporarily mount VPH pair using existing mounting holes for other assembly
 - Perform demonstration over few night period
 - Budget: \$50K

LRIS High Resolution Upgrade

- Evaluation

- The SSC recognizes the general importance of high resolution multiplexed spectroscopy and was impressed with the potentially elegant optical solution utilizing two holographic gratings.
- We also appreciate the candid assessment of the value of the proposed technical demo.
- We are reluctant to recommend expending funds and staff time on conducting the demo given that it is not needed to validate the basic concept.
- We are also very concerned about the complex and risky mechanical issues involved in implementing multiple gratings in LRIS, especially given LRIS's significant flexure issues. Thus it will not be possible to easily implement general purpose highres MOS capability simply or quickly.
- The SSC would need to see a fairly detailed scientific justification and implementation concept, and results of a narrow slit test, before considering this for further funding or eventual endorsement for TSIP or other grant funding.

- Conclusion

- The SSC does not recommend going forward with the test.

WMKO Observatory Report

- Proposal for purchasing advanced Sodium laser with TMT collaboration has been resubmitted to NSF MRI program.
 - Includes vendor quote and addresses key criticisms
- TCS Upgrade System Design Review will be in Waimea next week. New system to improve telescope pointing, reliability and maintainability.
- NGAO PDR committee has been assembled, and the review will take place June 14 & 15 in the LA area.
- KI LGS: Tests confirm that low return is caused by transport fiber to launch telescope.
 - Free space beam transport system to be completed in FY11 and OSIRIS move+re-commission in 2011B
 - Launch telescope works well: Laser spot has been improved to 1.3" (better than K2 and Subaru)

Major Elements of FY11 Observatory Plan

- Continues Observatory Operations
- MOSFIRE Delivery
- Improved OSIRIS grating (if technically feasible)
- K1 LGS (including OSIRIS move to K1)
- K2 launch telescope installed
- KCWI PDR
- TCS Upgrade PDR
- High risk seismic upgrades
- Keck Observatory Archive for NIRSPEC

These address high-angular resolution science, faint-object spectroscopy and observatory efficiency. No new projects for flexible observing.

Funding Profile

- Night Exchanges

- Will continue to exchange 24 nights per year with TSIP and NASA (combined)
- TSIP funds are allocated to the KCWI design study
- NASA funds from night exchanges (10 nights in 2010) are allocated to TCS upgrade

- Advancement

- Goals are in harmony with fiscal reality
- Half of the FY11 goal (\$750k) is in hand.

- Other Federal

- NSF/MRI, NSF/ATI programs are being hedged. Conservative success rate assumed.

Segment exchange update

- 16 of 36 K2 segments exchanged since Sept 2009; to be completed by Sept 2010.
- Segment coating chamber, and coating / exchange procedures have been improved
 - Best coatings in 10+ years
 - Mean improvement of 16% reflectance for each segment done thus far.

LRIS-R Update

- LRIS-R has been stable
 - No further degradation in detector
- Testing of new LBL devices continues.
 - Should be completed by May
- New upgrade approved and funded
 - Led by UCO
 - Building new dewar with new detectors & mounts.
 - Detailed design review for changes in May.
 - First light in February 2011

OSIRIS: Original Grating

- Overview

- Very large, coarse grating (~30 g/mm)
- Substrate is an expensive mushroom mount
- Vendor
 - Richardson -> Hyperfine -> Diffraction Products

- History

- First one had the incorrect blaze
- Replaced in June 2005 with the correct blaze

OSIRIS: Current Grating Efficiency

- Grating grooves
 - Poor (non-flat) profile
 - Significant fraction of light is reflected to incorrect orders (~15% to zeroth and 1st-order).
- Absolute efficiency
 - Measured in October 2009 at 1.3 microns
 - 5th order has ~30% efficiency
 - Off-the shelf gratings show efficiencies up to 75% implying an up to 2x improvement in S/N

OSIRIS: Grating Upgrade Plan

- Proposed Plan
 - Get scans of gratings from vendors
 - Obtain test equipment for efficiency measurements
 - Have a new blank made (SSG or glass)
 - Get the grating ruled
 - Measure the efficiency and install
- Cost/Timing/Risk
 - ~25k for test equip, 150k for grating
 - 1 month downtime (at summit) for replacement
 - Minimal risk aside from lower than hoped-for efficiency

OSIRIS: Current Detector

- Negative Characteristics
 - High dark current (limits S/N between sky lines)
 - Lots of artifacts
 - Spectral cross-talk
 - Channel floating

OSIRIS: Detector Upgrade

- Concept -- Hawaii-2RG with SIDECAR ASIC
 - No dark current
 - Minimal cross-talk
 - ~500k total cost
 - 3-5 months of downtime to re-focus OSIRIS
 - Re-calibration of instrument and upgrade of the DRP
 - No major risks
 - IR Lab is likely to have time to work on this in FY11

OSIRIS: SSC Comments

- Evaluation

- Current system is non-competitive for several important science areas
- Grating+detector upgrade would bring OSIRIS to the forefront of near-IR IFU observations (4-5x gain in sensitivity)

- Recommendations

- Contact grating vendors for quotes (ASAP)
- Begin preparation (this year) for an NSF/ATI proposal for a combined grating+detector project (to begin in 2011)

SSC Response to White Papers: - I

- SSC was encouraged by a strong response from the CARA community and beyond
 - 20 proposals spanning wide range of science and technology
 - 10 proposals addressing high contrast imaging and radial velocity detection of exoplanets
 - Others involving detector upgrades, interferometry and ToO science
 - A variety of requests from concept studies to supporting letters of endorsement for external funding
- SSC reduced the list to 13 proposals each of which was discussed and categorized as:
 - requires concept funding
 - requires a letter of endorsement
 - could be implemented
 - defer to a future call
 - reject
- SSC co-chairs will respond to all applicants based on feedback from named reviewers
- Some areas identified as high priority in the Keck SSP were not covered by the submissions.
- Eight proposals were selected for Phase II submissions, due June 18, 2010.

SSC Response to White Papers: - II

Lead reviews for the Phase II proposals were assigned as follows:

- Detectors (McLean): Ellis
- LRIS grating (Treu): Cohen
- Tertiary mirror (Prochaska): Martin
- NIRSPEC RV study (Plavchan): Greene
- NIRSPEC gas cell (Seifahrt): Marcy
- Sub-aperture AO (Serabyn): Liu
- Polarimetry (Fitzgerald): Beichman
- ExAO (Wallace): Ghez