# Keck SSC Report

Feb. 2014

# Observatory Report: Proposals & Productivity

- Proposals under review:
  - ATI ($1.8M) for NIRSPEC upgrade & MRI ($4.0M) for KCWI (red)
  - MSIP for NGAO invited to submit full proposal for next stage of this NSF competition.

- We congratulate the NGAO team for being invited to submit a full proposal to MSIP (in a highly competitive landscape)

- Productivity - publication rate exceeds 300/year with continued upward trend. 2013 will likely be another record year once records are complete
  - AO publication rate is 25% of total and growing
  - KOA is starting to generate significant download activity

# Segment Repair Project

- Budget, schedule, and project management plan development led by acting project manager Bill Irace
  - Preliminary detailed and credible cost and schedule estimates are now available
- Current work will be externally reviewed in early April
- Cost to complete from FY14 to end is $14.1M (in FY14 dollars) with 30% reserve and ending in 2020
- Cost estimate is preliminary
  - Processes & durations have been analyzed but cannot be considered definitive until the pathfinder segment has been processed
  - Lack experience in industrial scale production
    - Labor costs dominate
    - Hold 10% of the reserve in the 5 Year Plan at the observatory level
  - Initial estimate focused on performance and schedule, not cost.
  - WMKO has hired a full time project manager and an engineer with extensive production experience in industry

# Other Observatory Projects

- Collaboration w/TMT to upgrade Phasing Camera System software, will permit future upgrade of computer hardware.
- AO near-IR TT sensor
  - Achieved first light and loop closed on OSIRIS. Full characterization requires more clear on-sky time.
  - Shared risk science begins 2014B
- K2 LGS Launch Telescope System
  - First light Feb 2014, shared risk science 2014B
- TCS upgrade
  - < 1 arc sec rms achieved from elevation prototype. Work proceeding on AZ design and testing
- DEIMOS
  - Refurbish the grating slider/tilt mechanisms planned for FY14/15
  - Procurement of a new blue grating with x1.3 gain at 450 nm under way

# Keck 1 Deployable Tertiary

- Implementation of approved NSF MRI grant
  - Co-PIs J. Prochaska, J. Nelson, T. Armandroff
  - $1.5 M + $0.6M cost share
- Enhances observing flexibility & enables ToO+cadence observing
  - Project started 10/2013
  - Detailed specification and design underway, PDR in 7/2014
  - Large mirror is being purchased early
  - DDR 1/2016
  - Commissioning 11/2016
- Committee set up to propose TDA implementation plan as presented in the approved NSF proposal (1 FTE @ WMKO)
  - Hillenbrand+ Knutson (CIT), Bloom+TBD (UC), Goodrich (Keck), Prochaska (ex officio)
  - Progress report to be presented at July SSC meeting & discussion at Keck Science meeting

# Instrument Reports

- The SSC appreciates the instrument reports from each of the instrument masters.
- OVERHEADS: Bob Goodrich ---- The telescope overhead was analyzed in order to support future efforts to optimize efficiency.
- MOSFIRE: Marc Kassis ---- MOSFIRE is now working very well. Commend team for solving CSU failure problem which was primary cause of lost time.
- NIRSPEC: Greg Doppmann; NIRSPEC is working well. There is an upgrade proposal for the science detector which would result in an decrease of a factor of 6 in integration time to achieve a given SNR.
- OSIRIS: Jim Lyke --- Improvements were made in the grating and in the DRP. Must fix DRP problem introducing bad spaxels. Two detector upgrades are funded, and will be available in 2015 for IFU spectra & 2016 for imager.

# Instrument Reports (cont'd)

- LRIS: Luca Rizzi – LRIS had a good year, with no major issues and high scientific productivity.
- HIRES Scott Dahm - HIRES has been very stable, with only minor issues.
- NIRC2: Hien Tran –Two cold heads were replaced, and a major reboot problem was dealt with.
- DEIMOS: Greg Wirth – A grating servicing mission is being planned to fix broken belts and worn mechanisms, which are the one largest un-addressed source of lost sky time. The cost would be approximately $100k and will require approx. 6 weeks of downtime should be scheduled to minimize scientific impact.
- ESI: Greg Wirth – ESI had close to zero lost time in 2013.
- Approved plan to install vector vortex coronagraph into NIRC-2 for technical demonstration of L-band extreme AO imaging led by Gene Serabyn of JPL.

AO Operations; Randy Campbell **– Keck is the first institution to win FAA approval to replace human aircraft spotters using aircraft transponders.**

# KCWI Status
# (P.I. Chris Martin)

- The SSC remains enthusiastic for KCWI science (both channels).
- Good technical progress on camera
  - 3 of 4 large optics complete with 4$^{th}$ on track.
  - Camera articulation unit delivered.
- Some technical issues:
  - Large optics coatings and AR coatings
  - CCD dewar vacuum hold time problem addressed with addition of getter
- KCWI-red proposal submitted to NSF-MRI.
  - Adds many YSO applications, more extra-galactic and high-z science.
- Two science papers accepted for publication from Palomar CWI

# KCWI Technical Overview (Patrick Morrissey)

- IFU--- Good progress at WINLIGHT with delivery of first image slicer in October 2014.
- Over-coated silver coatings required for maximum blue performance
  - Optimization for short wavelength cutoff at 350 (overcoated silver) vs 360 nm (aluminum)
  - Concern about durability of overcoated silver coating
  - WINLIGHT will provide test plan later this year. Project will discuss coating issues with UCO.

- Large optics fabrication
  - KM1,2,3 complete, in house, coating underway
  - Collimator and FM1--- in final polish. Ready in few weeks. Coating vendor ready to go.
  - Epoxies for bonding of optics being tested. No significant problems

- Blue camera --- Investigation of AR coatings underway at vendor/UCO. Few ~0.1% required for low ghosting. Some modest performance issues but present performance "acceptable." Still some uncertainties for design of CaF2 coatings remain.

# KCWI Technical Overview (cont'd) (Patrick Morrissey)

- Gratings---Project would like to buy 5 gratings. May need to defer 3 to preserve $40k
- Articulation stage being assembled
- Blue exchanger moving into I&T
- Camera Dewar– Some problems with maintaining vacuum. Adding getter (charcoal) helps.
- Large optics mounts--- in fabrication
- K-mirror and optical bench on critical path. Drawings next quarter
- Software--- demonstrated use of KCWI s/w to operate CWI CCD at Palomar
- Overall status--- **on track but at the expense of schedule and budget reserve.**

# Data Reduction Pipelines

Present level of DRP / Keck I

| Instrument | DRP/DRT | Author(s) | Current level of support | Installed/ Running at Keck | KOA DRP status |
|---|---|---|---|---|---|
| HIRES | MAKEE | T. Barlow | 2 | Yes | Used for processing |
| | HIRES redux | J. Prochaska | 1 | Yes | |
| LRIS | Low-Redux | J. Hennawi, S. Burles, J. Prochaska | 1 | No | Raw data only |
| | Starlink+Pamela+Molly | D. Levitan | 1 | No | |
| | Kelsonware | D. Kelson | 1 | No | |
| MOSFIRE | Mosfire DRP | N. Konidaris, C. Steidel | 1 - 2 | No | Raw data only |
| OSIRIS | OSIRIS DRP | OSIRIS DRP team, OSIRIS Keck Support Team | 3 – 4 | Yes | Used for processing |

# Data Reduction Pipelines

Present level of DRP / Keck II

| Instrument | DRP/DRT | Author(s) | Current level of support | Installed/ Running at Keck | KOA DRP status |
|---|---|---|---|---|---|
| DEIMOS | Deep2 pipeline | DEEP2 team | 2 | Yes | Raw data only |
| | IDL tools | P. Capack | 1 | No | |
| | Kelsonware | D. Kelson | 1 | No | |
| ESI | ESIRedux | J. Prochaska | 1 | No | Raw data only |
| | MAKEE | T. Barlow | 1 | No | |
| NIRC2 | KOA-only tools developed in house | H. Tran, KOA | N/A | N/A | Used for processing |
| NIRSPEC | WMKONSpec | Keck NIRSPEC support team | 1 | Yes | Under development |
| | REDSPEC | UCLA IR lab | 1 | Yes | |

# Data Reduction Pipelines

- The SSC thanks the SAs for collecting the information on the status of the data reduction pipelines.
  - These pipelines play an increasingly important role in producing science in a timely manner.

- The slitmask design software for LRIS, DEIMOS, and MOSFIRE should be supported by WMKO because it is essential for observing.
  - WMKO agreed to present a plan for taking responsibility for this software at the July SSC meeting.

- The SSC asks WMKO to present a plan (including costs and impact on other ongoing projects ) for supporting a MOSFIRE pipeline with basic functionality to eliminate instrumental signature for multi-slit and long slit observations.