

KECK SSC MEETING NOTES

Co-chairs: Judy Cohen & Crystal Martin

February 23-24, 2016

Waimea, HI

Acknowledgements

- There will be a one day symposium at UCLA Sep. 14th to celebrate the life of Mike Jura, co-founder of UCLA's investment in IR astronomy
- SSC thanks the support astronomers for their continued support of WMKO science and their excellent reports.
- SSC thanks James Graham for his service to the SSC.
- SSC commends WMKO on the timely completion of the pathfinder segment, and notes its excellent performance (14 nm rms over the entire surface).

SHREK

Successful System Design Review on 17 Feb 2016 with top level questions and answers:

Is PI change acceptable? *Yes ! The committee expressed high confidence in the PI and the team.*

What is the international context for SHREK?

SHREK is a compelling instrument, important both for survey work and in the context of several NASA space missions. It would be the only high precision RV instrument in the northern hemisphere on an 8-10 m telescope, with comparable science being possible in the south with the future VLT/ESPRESSO.

Does SHREK have the appropriate capabilities to perform this forefront science. *Yes!*

SHREK team now addressing technical issues raised at review using the limited funding remaining from the System Design phase.

Presented Dec 2018 as first light; team now carrying date later by one quarter, and observatory planning for Oct 2019.

SHREK – SSC Statement and Endorsement

SSC has full confidence in the PI and endorses the instrument including both blue and red arms. Addition of a laser comb should be explored if funds permit

Plan is that SHREK team should seek the needed instrument funding from private foundations:

Complete Preliminary Design phase (~\$2M)

Carry out Construction phase (~\$6.5M)

Time is of the essence given launch date for TESS (late 2017)

SHREK schedule should allow SHREK to be commissioned before the PRV instrument planned for the 4m WIYN telescope for competitive reasons (first light in 2019)

SHREK is a key instrument for NASA continuing as a Keck partner, review for next 5 year cooperative agreement will be in 2018.

Coronagraphic Testbed on Keck AO

D. Mawet (Caltech), E. Serabyn (JPL; PI) & P. Wizinowich (WMKO) request to pursue NASA funding to implement a coronagraph module on the currently approved and funded fiber injection unit linking Keck-AO & NIRSPEC. Aim is to realize a “dark patch” for exoplanet studies.

Keck SSC feedback:

Recommend that \$1.2M proposal moves forward so long as current AO science operations are not impacted.

Metric for current and future AO performance should be documented.

Benefit to Keck is engagement with AO experts in the community who could identify improvements in AO systems.

Would like clarity on whether and when this capability would be usable by Keck Observatory community; impacts thinking on where nights to commission this capability should come from.

SSC co-chairs have drafted two communications to Mawet approving 1) the funding proposal for future work, and 2) a separate request to “facilitize” recently completed work commissioning an L-band vector vortex coronagraph and optimizing its performance, with the initial plan to make the system available for shared-risk observing for 1 yr followed by open use by the WMKO community.

Commissioning time to be negotiated with WMKO director.

KCWI-Blue

- Significant cost & schedule overruns led to Project Closeout Plan review in Jan 2016, attended by KCWI team, JPL, Caltech & WMKO.
- Results:
 1. New bottoms-up cost estimate, detailed schedule & status tracking, & work agreement signed by PI.
 2. New schedule: ship Oct. 21^t, 2016, first-light Jan 2017, shared-risk science in 2017B.
 3. Substantial I&T completed, so major risks now retired.
- KCWI Science Advisory Team involved in planning for final I&T, commissioning, and science verification.
- Reporting by the project must track progress relative to the plan (and not just progress).

KCWI Recommendations

- SSC is pleased that KCWI-B has been re-planned and restarted
- SSC is excited about the compelling science case for KCWI-B .
- SSC would like to see measurements of total throughput and blue sensitivity for KCWI-B as soon as possible
- At system design review, the KCWI-r project must demonstrate that appropriate lessons have been learned regarding cost control and project management based on the problems encountered with KCWI-B.

Observatory Report (1)

- 2015 Publications: Keck continues to be extremely productive, including 17 PhD theses (10-15% of all US PhDs). relatively constant in past few years.
- Three NSF proposals now under review: K2 AO upgrade (MSIP), K2 AO IR wavefront sensor (ATI), NIRSPEC Precision RV (MRI)
- TCS upgrade finishing this year (K2 then K1): improved acquisition & pointing
- New K2 laser: ~20x brighter return (R=7.5 mag), on track for April completion
- OSIRIS spectrograph detector upgrade: on track for April completion
- NIRSPEC major upgrade of detectors & electronics starting, with shutdown planned Oct 2017 - Jan 2018 & first light in Feb 2018
- K1 Deployable Tertiary: first light in March 2017. Working towards full cross-partnership implementation of both ToO and cadence observing.

Observatory Report (2)

- KCWI-Blue: delayed, first light now Jan 2017, shared risk in 2017B
- NIRES: current estimate is shared risk in 2017A, but uncertain
- Mirror segment repairs planned to start later this year on segments that currently cannot be used.
- Expected completion of segment repair project in 2019.
- WMKO continues to contribute to Mauna Kea community outreach in Hawaii, building relationships with Hawaii government officials and the public
- Three new experienced support astronomers have been hired recently.
- Keck Strategic Plan: task forces completed, integration & adoption upcoming.

Instrument Reports

Observing metrics

- 24% observing time lost to weather in 2015 (compared to historical average of 15%)
- Concern that on-target, telescope inefficiency is increasing. Recommend a study to understand the causes.
- DEIMOS Fault time increasing: 5.2% in 2015
- No cross-institutional ToOs invoked so far.
- Recommend a method to record even informal ToOs.
 - Assign PIG number for unofficial ToOs.
 - Provide link to 'interrupt policy page' on afternoon checkout list for all instruments.
- Cadence observing needs discussion in the near future.

Data reduction pipelines

- MOSFIRE: owned and distributed by WMKO
- OSIRIS: many outstanding DRP issues; some (especially flux mis-assignment) are serious.
- NIRES and KCWI: DRP owned by WMKO upon instrument delivery
- NIRSPEC: pipeline being developed for KOA could be expanded as general purpose pipeline
- Observatory needs to be proactive about collecting pipelines from the community.
 - Example: Multiple NIRC2 pipelines exist.

DEIMOS

- Service Mission repaired video boards but did not solve grating issues.
- Increased demand for DEIMOS imaging
 - New V filter and zeropoints measured for *VRIZ*
 - New imaging scripts
- Most DEIMOS faults due to grating subsystem
 - Service Mission 2 scheduled for March to improve sliders 3 and 4 and reduce flexure to pre-Service Mission 1 values
 - Many grating issues manifest as FCS problems, which are addressed with operational workarounds and software (“Fix FCS”)
- Discussion in progress to put pipeline (DEEP2DRP) onto Github
- Procurement of blue grating moving forward with 10 month lead time

MOSFIRE

- Compensation for differential atmospheric refraction and guider flexure now implemented
- Thermal stability of electronics improved (fixed set points on thermal control system)
- Slitmask design software (MAGMA) updated
- Instrument faults are mostly due to guider and a control board failure, disk failures

LRIS

- Image Quality Monitoring (IQM) in MAGIQ greatly improved
- Dichroics have been realigned
- LRIS instrument faults responsible for just 5 hours lost in 2015
- New LRIS GUI being developed to facilitate other software upgrades (e.g., VNC servers); include instrument light path
- Plan to port MOSFIRE DRP to LRIS
- Future projects: throughput monitoring, fix 5th grating port

HIRES

- Very stable year
 - Repaired video board on CCD1
 - New shutter mechanism controller
- Future work: new deuterium lamp for blue flux in flat fields

NIRSPEC

- Successful recovery from cracked dewar window. Spare under procurement.
- Clean optics to remove artifacts in flat fields
- Server crashes still dominate faults.
 - Increase in crashes in last 3 years.
 - Perhaps due to dirty fiber optics and/or AO/non-AO reconfigurations.
- New Level-1 DRP in KOA and quick-look at telescope
 - Point source optimized. Automated.
- Funded NIRSPEC detector upgrade underway
 - 6.5x improvement in time for a given SNR.
 - New slit viewing detector for science quality long wavelength imaging
 - Improved grating stability
 - Remove from service in late 2017B, re-commission in early 2018A
- Proposal for precision radial velocity submitted to NSF MRI

ESI

- Fixed small operational issues, but overall very stable performance over the year

OSIRIS

- Rectification matrices: hot pixel problem addressed
- DRP flux mis-assignment problem not yet solved, but broad working group of users and Keck SAs now working on it
 - Suggest concerted co-located effort of key players, e.g., Hack Week at UCLA, to understand and correct problems
 - Chief Scientist will organize
- SPEC detector upgrade underway with small issues (USB interface, 60 Hz pickup) being addressed.
- Return to service mid-April

NIRC2

- Service mission complete
 - L band vortex coronagraph installed, delivered with pipeline
 - Cold heads purged
 - AO bench realigned
- Temperature fluctuations being monitored

Keck Observatory Archive

- All instruments, including NIRC and LWS, now represented in KOA
- KOA accepts user-contributed, high-level data products
- VO compliant
- ADS bibcodes implemented
- Includes interactive visualizers
- NIRSPEC DRP implemented
- LRIS DRP study complete
- KOA won 2015 NASA Achievement Award!

Mainland Observing

- Now available at 10 mainland-only sites and 5 eavesdrop sites
- Newest site is at USRA (Maryland)
- Mainland observing (eavesdrop + full remote) used more than 50% of all nights in 2015
- Recommend study of internet backup using current technology.
 - Very difficult to install ISDN line in CA these days.
 - What alternatives could be explored?
 - Report results to SSC in November 2016.

NIRES

Remaining tests and technical issues, both hardware and software, are being worked at Caltech.

The list of remaining issues is quite short, major one is electrical noise.

Ship date no earlier than Apr 2016, still highly uncertain.

Observatory plans for first light and shared risk science to be made as warranted in the future.

The WMKO community eagerly awaits this instrument and the new scientific opportunities it provides for full spectral coverage in a single exposure over the 0.9 to 2.4 micron region.

AO Operations

- Fixed L-band elongation
- TRICK transition to operation underway
 - There are still some TRICK faults that need to be fixed.
 - Keck II center launch completed.
- Vector Vortex experiment: Plan to transition to operational capability
- LGSAO fault trends show increase in laser or laser uplink related to center launch system.
- LGSAO time lost to weather is 23% over 10 years (due to stringent weather requirements).
Some of this time was used for NGS AO

WMKO Visiting Postdoc Concept

- Proposal from Australia to fund postdocs to visit Keck Observatory for 3-12 months
 - *Training opportunity for young scientists*
 - *Potential for additional workforce at WMKO*

WMKO Visiting Postdoc Concept

Items for consideration

- *Potentially good for Keck Observatory*
- *WMKO should define projects that correspond to their priorities and needs. WMKO should be involved in selection of participants, who must have appropriate skills*
- *Any WMKO partner can choose to participate*
- *Science supervision required ? one solution is half-time at home institution and half-time at WMKO*
- *A very small number of postdocs at any given time*
- *Projects selected based on a realistic expectation of what a postdoc can accomplish in a few months*

Five Year Plan (open session)

- Preliminary 5 year plan was presented; will be amended when strategic plan is completed
- Final 5yr plan and annual plan to be presented to CARA Board in June
- Priorities are to maintain current operations, complete segment repairs, complete major projects underway, mitigate risks, and implement cost savings
- SHREK will be included once it has been fully approved