

SSC Meeting Notes

19-20 June, 2019

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2019 White paper and Phase A funding call: summary

- 7 white papers and 5 Phase A proposals were submitted
- Topics include new instrument concept and AO studies, upgrade studies, and calibration studies
- Total funding request for White Papers over-subscribed by a factor of ~2 relative to available funds.
- Total funding requested for Phase A studies: oversubscribed by ~x4 vs. the available funding for this year.
- Future years will have a higher level of Phase A funding available.

White paper summary

Project	PI (institution)
DEIMOS Detector Upgrade	Kirby (Caltech)
Keck AO Data Science	Jensen-Clem (UCB)
IGNIS	Mace (UT Austin)
OSIRIS Calibrations	T Do (UCLA)
VIPA demonstrator	Mawet (Caltech)
HAM for OSIRIS	Sallum (UCI)
OSIRIS Ext Interferometer	Erskine (LLNL)

Phase A proposal summary

Project	PI (institution)
FOBOS	Bundy (UCO/UCSC)
AO upgrades	Wizinowich (WMKO)
BIRES	Cohen (Caltech)
Keck PFWI	Cooke (Swinburne)
NIRC2 Upgrade Phase II	Mawet (Caltech)

FOBOS – Status of 2018 White Paper Studies

- FOBOS is a 0.31-1.0 μm $R \sim 3500$ instrument, 1800 fibers (based on the need for high target density), 20 arcmin diameter FOV.
- Key capabilities: no redshift desert, continuous coverage of Ly-alpha $z > 1.5$ (PFS limited to $z > 2.2$); high target density (6/arcmin²), dynamically configurable focal plane and deployable IFU. Good fit for GLAO when it comes online.
- The initial phase has been building the science case coupled with institutional visits, and adjusting the design to meet the diverse science goals.
- Other recent developments include: a focal-plane trade study, optical and spectrograph design improvements, and fiber-system risk mitigation study (UCO funded).
- The calibration system would require a high-quality flat-field. Initial discussions are underway about adding a dome screen, and further consulting with calibration experts (e.g., Renbin Yan, Jim Gunn (PFS)) is now being pursued.

BIRES – Status of white papers

- BIRES is 0.32-1 μm , $R\sim 4500$ single-slit spectrograph (4k x 4k). Optimized for TDA use, but also useful for other single-object science. Spectrograph design optimized for UV/blue where similar capabilities do not currently exist @WMKO.
- Primarily unofficial goal would be to replace ESI, obviating need for K2-DM3
- Optical design is based on ESI heritage, yet BIRES provides factors of 2-5 improvement in throughput (depending on wavelength).
- The selection of Keck I is based on the availability of bent-cass ports and the deployable tertiary mirror in KI. The location and coordination of BIRES with other instruments would need further investigations and optimization.
- The slit is to be aligned with the elevation direction, thereby avoiding wavelength-dependent slit losses due to atmospheric refraction. Keck team agrees that the bent cass port would allow this capability without an image rotator.

New White Papers

DEIMOS detector upgrade

- PI Evan Kirby (Caltech).
- Proposes to study an upgrade to DEIMOS detector mosaic
 - Will increase quantum efficiency (QE) and operational efficiency
 - Will assemble a science team to assess the feasibility and usefulness of each of the possible new technologies
 - Request funding to support detector engineer Roger Smith.

Holographic aperture mask for OSIRIS

- PI Steph Sallum (UCSC/UCI).
- Proposes to fabricate and install a holographic aperture mask in the OSIRIS Imager. Improves spatial resolution up to $0.5 \lambda/D$ at higher throughput and more baselines than NIRC2 non-redundant aperture mask.

Bringing Data Science to Keck AO

- PI Rebecca Jensen-Clem (UCB/UCSC).
- Proposes to develop a database of Keck AO telemetry and make correlations with science image quality. Will host hackathons to engage and leverage Keck AO community. Will propose for more sophisticated data science analysis.

Virtually Imaged Phased Array

- PI Dimitri Mawet (Caltech).
- Proposes to test a prototype VIPA spectrograph on Keck with new (NIRSPEC) fiber injection unit. Uses novel FP-like VIPA optic.

IGNIS spectrometer

- PI Gregory Mace (UT Austin).
- Proposes to study cloning the GMTNIRS IR spectrograph for Keck. Would provide simultaneous JHKLM (1-5 microns) @R~45,000 spectra

Improving OSIRIS Calibrations

- PI Tuan Do (UCLA).
- Proposes to improve OSIRIS calibration by assessing needed frequency of rectification matrices and wavelength calibrations, develop data quality metrics, design a calibration etalon, hold OSIRIS hackathons to improve DRP

OSIRIS Interferometer

- PI David Erskine (LLNL)
- Proposes to study the feasibility of using externally dispersed interferometry (EDI) to increase OSIRIS spectral resolution by $\sim 3X$. Will compute S/N estimate and investigate telescope and instrument interface issues

New Phase A Proposals

FOBOS

- PI Kevin Bundy (UCO/Lick).
- Proposing to complete conceptual design, develop cost estimates, plan submissions for upcoming funding opportunities provided by the NSF and others, and advance design of high risk components to prepare for MSIP

Keck AO Improvements

- PI Peter Wizinowich (WMKO). Request ~1000 hr WMKO time
- Proposes to develop a funding proposal to upgrade and refurbish Keck AO infrastructure. Topics include reducing thermal background, improving nIR low-order WFS, improving astrometric stability.

Keck Wide Field Prime Focus Imager

- PI: Jeff Cooke (Swinburne). Request: SSC endorsement to proceed with design work.
- Proposes to continue design work for a wide-field (0.7-1 deg) prime focus imager optimized for near-UV observations.

BIRES

- PI Judy Cohen (Caltech).
- Proposes to develop the BIRES concept for a funding proposal including enlarging the science team, closing trades, and advancing the technical design to PDR in preparation for a funding proposal

NIRC2 Detector and Electronics Upgrade

- PI Dimitri Mawet (Caltech).
- Proposes to upgrade the obsolete detector electronics and host computer and to add the capability to do focal plane wavefront sensing (speckle suppression).

KCRM Update

- PDR held January 2019
- Delta review held April 2019
 - Demonstrated enhanced system engineering; system engineer on board
 - Reviewed costs and worked to bolster contingency reserves
 - Lingered concerns:
 - Need monthly tracking of costs and accomplishments
 - Need to understand project milestones
 - Need to address camera optics critical path schedule slip
 - Project will address these concerns and report to review chair
- Integrated master schedule completed; commissioning in 2022A
- Critical path items include detector (UCSC), camera optics (CIT/Winlight)

KCRM Update (2)

- Schedule issues:
 - Optics blanks for CaF₂ would take 12 months: 6 month schedule slip on critical path
 - Camera design studies have also slipped 1-2 months
 - Selected random orientation CaF₂ crystal as this should not impact long wavelength performance and is easier/faster to procure than single crystal
 - Working on flexible plan for AIT to accommodate sub-assembly deliveries
- Gary Parks and Michael Brenner have been providing management guidance and assistance
- Ongoing concerns include funding, camera optics, limited staffing resources
- KCRM project manager search has been initiated at COO
- KSOC now reports to WMKO Chief Scientist; organizational structure is working

ToO Updates

- LIGO is finding candidates, but most are BH-BH mergers that are not expected to have optical counterparts
- ToO triggers have been executed in April, May
 - One event was triggered on KI and KII on the same night
- TORT was successful in 2 of 3 triggers; failure was linked to date error in software and subsequently fixed
- ToO policy reminder was issued with 2019B allocations; ToO observers need to be well prepared to use the instruments they plan to use