

Minutes of the Winter 2019 UCOAC Meeting

February 6th 2019
Physics & Astronomy Building
UCLA, Los Angeles, CA

Attending in person: Gillian Wilson (Chair, UCR), Marusa Bradac (UCD), Andrea Ghez (UCLA), S Lori Lubin (UCD), Shelley Wright (UCSD), Jean Brodie (UCSC), Aaron Barth (UCI), Michael Fitzgerald (UCLA), Tommaso Treu (UCLA), Anna Korossy (UCSC), Ian McLean (UCLA), Connie Rockosi (UCSC), Brad Holden (UCSC), Alice Shapley (UCLA)

Guests attending: John O'Meara (WMKO Chief Scientist, in person), Luca Rizzi (WMKO, remote)

Attending remotely: Alex Filippenko (UCB), Michael Cooper (UCI), Andy Skemer (UCSC), Ben Mazin (UCSB), Michael Bolte (UCSC), Jason Prochaska (UCSC), David Schlegel (LBNL), Joseph Hennawi (UCSB), Mariska Kriek (UCB)

Notes: Due to unforeseen circumstances, UCO Director Max was unable to attend the meeting, and UCOAC Chair Wilson was unable to attend the morning session. Notes on the morning session were taken by Aaron Barth.

UCO Mini-grant Reports

The PIs of four of the 2015-2016 and 2016-2017 UCO mini-grant awards presented reports on activities and outcomes supported by the funding received:

PypeIt (Prochaska, Hennawi):

- Python is a data reduction pipeline (DRP) for Keck and Lick
- Currently in beta-testing, v1 release anticipated in late February with documentation for an initial instrument set
- Goals: fully open source environment for automated science-ready reductions for all UC facility spectrographs, and to enable usage of archival data
 - Photon-limited sky subtraction and excellent flux calibration
- Hosted on github
- Intended to run in fully automated mode, but customizable
- Extensible to other optical/IR spectrographs
- Example notebooks for sample reductions
- Recommendations from PypeIt team:
 - Integrate within WMKO infrastructure. Discussions ongoing, plans to run during NIRES and LRIS nights.
Integrate with Lick raw data archive
 - Hold workshops at UC campuses for user training

- Eventually WMKO will be the point of contact for user support for “tier 1” pipelines (see WMKO section below)

MOSDEF Pipeline (Kriek):

- MOSFIRE pipeline optimized for faint object spectroscopy, written in IDL
- Completely automated (including wavelength, telluric, and flux calibration), and has some technical advantages over the initial MOSFIRE pipeline and other IR data reduction packages, monitors MOSFIRE spatial drift
- Can achieve ~10% S/N improvement over other pipelines in many cases
- Outputs fully reduced and calibrated 2D data and noise frames, 1D response spectra
- Working on automatic 1D extractions
- Currently available via email request, with support provided. Still in beta-testing. Used by ~6 other groups so far.
- Plan is to distribute via github by summer 2019.

FOBOS-DESI Conceptual Design (Schlegel)

- Plan for a fiber spectrograph for Keck that builds on DESI design work
- Fibers allow for access to full 20 arcmin FOV and >500 multiplexing
- Improvements in fiber spectroscopy and sky subtraction make fibers increasingly attractive for faint object spectroscopy
- Activities during 2015-18:
 - Initial conceptual design
 - Student worked on sky subtraction
 - Community workshop at LBNL
 - Optical feasibility study by Tim Miller (UCB/SSL)
 - Fiber spectroscopy workshop at LBL
- DESI spectrograph design would work for Keck without modification. Cost about \$1.5M per spectrograph. Need focal reduction to feed fibers: studied microlenses for fiber feed
- Can use single fibers or fiber groups (7 fibers)
- Examined size and weight constraints of Nasmyth deck and location options

TMT Coronagraph and PSI (Fitzgerald)

- The aim is to be able to characterize planets in reflected light with TMT
- The TMT white paper was highly ranked by the Science Advisory Committee (SAC)
- Growing international partnership
- Design: extreme AO system with red channel (2-5 micron), blue channel (0.6-1.8 micron), and a potential third mid-IR channel
- Red and blue sides each have a coronagraph, imager, high-resolution spectrograph
- Considering possible commonality of front-end AO with MIRA/MICHI
- Team members from UCLA, UCSC, UCSB, COO, UH, and Stanford

Keck SSC Report (Brodie)

- Agenda items for upcoming Feb 20-21 SSC meeting:
 - Instrument updates: OSIRIS & pipeline, NIRSPEC, NIRC2, AO
 - SCALES proposal
 - ISDN requirement changes & observer risk, Zoom update

- 5-year plan
- Proposal process & timeline
- MSRI proposal planning
- Updates on KPF, KCRM, IR laser frequency comb

LIGER Update (Wright):

- Motivation: numerous science cases for an IFU with larger IFU, higher spectral resolution, and shorter wavelength capability than OSIRIS
- LIGER is based on TMT IRIS design. Helps to mitigate IRIS risk and improves engagement with IRIS industrial partners
- LIGER received UCO mini-grant funding in 2016 and submitted a Keck white paper in 2017, presented update to SSC in 2018
- Ongoing work includes end-to-end simulations, system engineering design, opto-mechanical design, electronic designs, software design to meet WMKO requirements, prototyping of gratings
- Planned capabilities include both lenslet & slicer, with possible down select to one
- Other possible new capabilities: extending to <1 micron, larger FOV, $R > 8000$, parallel imaging
- Spectrograph design is identical to IRIS slicer & lenslet.
- Spec detector: H4RG-15. Imager could start with H2RG and be upgraded to H4RG-10
- Internal reviews planned for June/July 2019
- Hiring engineer and postdoc at UCSD, also engaging UCSD grad students

FOBOS Update (Bundy):

- Highly multiplexed spectroscopy was identified as a priority in the Keck strategic plan
- FOBOS designed for depth & stability. Can go deeper & denser than Subaru PFS, plus has UV sensitivity. FOBOS designed to have 1.7x greater survey speed than PFS
- Supported by WMKO white paper funding & UCO mini-grants. UCO funding used to demonstrate fiber coupling on a fiber test stand
- Conceptual design phase is 70% complete
- Design: 1800 fibers, 20 arcmin FOV, 310-1000 nm coverage at $R \sim 3500$. 3x 4-arm spectrographs. Lateral ADC with “starbugs” positioners. Could allow for deployable IFUs and could work with GLAO
- UC community feedback:
 - Strong support for ~ 2000 multiplex spectroscopy, UV sensitivity
 - These requirements require a different spectrograph design than DESI design- more like Fiber-WFOS design

WMKO Chief Scientist Introduction and Priorities (O’Meara):

- Where astronomy is headed: Transient & multi-messenger astronomy, wide-field surveys & missions (Gaia, Euclid, WFIRST, LSST, DESI, PFS, TESS), deeper observations (JWST, TMT), increasing integration of facilities
- Keck initiatives/ priorities:
 - Faster response to transients & ToOs
 - Quick return of science-ready data to community
 - Expansion of AO to more of the sky

- GLAO
- Wide-field multi-object spectroscopy
- Wider field IFUs
- Robust data management & processing for all instruments
- Leveraging archives as discovery engines
- Better integration: coordinated simultaneous observations, deeper partnerships with space missions
- Ground-based data archives should be more than just bit buckets
- An overview of the WMKO instrument incubation/development model was presented. There is a need to preserve flexibility for different scales/cost levels of instrumentation, while still having strict requirements for final proposal/build phases of project.

Keck Data Reduction Pipelines (O'Meara, Rizzi):

- In 2017, WMKO made a proposal to the Keck Science Steering Committee (SSC) to i) coordinate the development of pipelines, ii) create a general framework, and iii) gradually modify the observing infrastructure so that so that observations and calibration are coordinated with archiving and data reduction. The coordination between the different component of the project (WMKO, KOA, Pipeline developers) will happen by means of a Data Reduction Working Group (DRWG). SSC supported the model and asked WMKO to proceed with the project.
- Luca Rizzi, in collaboration with KOA, prepared and proposed a DRP project for FY19, aimed at designing the common pipeline framework. The project was presented to current development teams (KPF, KCRM, SCALES, PYPEIT) who supported it. The FY19 planning process included support for this project, which was launched in October of 2018. It is planned to have a preliminary design of the framework in April/May, and a final design by August. At the same time, a number of parallel projects are underway to produce a streamlined and unified data management infrastructure (semi-automated observing sequences, automated calibration tools, complete FITS headers, on-the-fly ingestion of data in KOA, on-the-fly quicklook reduction with web access to reduced data)
- Because pipelines already exist and to promote their use and their integration into our framework, a three-level system has been devised:
 - Tier 1: Officially supported WMKO pipelines using common WMKO-developed infrastructure.
 - Tier 2: Externally developed pipelines meeting specific software/interface requirements and developed in coordination with the Data Reduction Working Group (DRWG). Supported by SAs on a best effort basis.
 - Tier 3: Externally developed pipelines that don't meet DRWG requirements. Not supported by WMKO but scientific value will be recognized by listing them on the data reduction web page for each instrument.
- Current status:
 - Finalized governance model for the development of the common infrastructure and for the individual (Tier 1) pipelines.
 - Finalized requirements documents for developers who would like to produce Tier 2 pipelines while the common framework is being developed.

- Finalized requirement document for the pipeline framework.
- Trade study between different existing frameworks in progress
- Project is being promoted in the community

UCO Business

UCOP 5-year Report (Rockosi)

A five-year report covering the period July 1, 2014 through June 30, 2019 will be due to UCOP at the end of September 2019. It will be reviewed by the UC-wide Senate University Committee on Research Policy (UCORP). Information will be required on i) grants ii) research productivity: publications, students, science highlights iii) education mission: students iv) multi-UC collaboration v) public outreach, engagement vi) the positive impact of UC in California, and vii) UC leadership in world-wide astronomy research. It is anticipated that email will be sent to individual users in the spring quarter. UCO will make a best effort to compile publications and UCO-related grants. Users will be asked to verify their own group's publication list and UCO-related grants, and also provide additional information about students and junior researchers who have used UCO telescopes, awards and press-releases, multi-campus collaborations etc.

Automated Planet Finder (APF) (Holden)

Due to increasing demand on APF some issues have come to the fore:

- There are some programs (not necessarily large) that require long-term status.
- There is an increasing need for a ceiling (75%) long term requests to ensure time for small programs.
- A proposal template is needed
- A ToO policy is needed.

TMT

Mike Bolte summarized recent news about the project and Tommaso Treu presented a report on the most recent Science Advisory Committee (SAC) meeting.

2019 Spring Meeting

The spring (northern California) UCOAC meeting will be held in northern California on a date yet TBD.