

MINUTES OF THE UCOAC MEETING
UC Berkeley, 9 December 2010

Attending at UCB: Mike Bolte (UCO Director; UCSC), Alex Filippenko (UCOAC Chair; UCB), Gabriela Canalizo (UCR), Gary Chanan (UCI), Burt Jones (UCSC), David Kirkman (representing David Tytler, UCSD), Lori Lubin (UCD), Geoff Marcy (UCB), Clair Max (UCSC), Ian McLean (UCLA), Jerry Nelson (UCSC), Mike Rich (UCLA). Others (not UCOAC members): Steven Beckwith (Vice President of Research and Graduate Studies, UCOP), Arti Garg (UCOP), Jenny Gautier (UCOP), Maureen McLean (UCSC), Paula Towle (UCSC), John Wareham (Lick Observatory).

Introduction: Alex Filippenko

Alex thanked his staff assistants at UCB for making the meeting arrangements and everyone for attending. He introduced members of the UC Office of the President, who attended the meeting and made a presentation regarding the upcoming UCO review. He also introduced John Wareham, Deputy Director of Operations at Lick Observatory (Mt. Hamilton); he replaced Rem Stone on April 1. UCOAC members should provide updates to their campus colleagues and discuss issues with them, bringing new matters to the attention of Alex and Mike.

UCO Report: Mike Bolte

Lick 3-m Shane Telescope Use: Demand for time on the 3-m telescope remains high, necessitating review by a TAC. The main campus using the 3-m is UCB, except when large programs such as AGN reverberation mapping (run by Aaron Barth at UCI) are being conducted. The Kast spectrograph is the most popular instrument, followed by the Hamilton spectrograph. Roughly 30 to 40 refereed publications per year result from the 3-m observations. Remote use (from various campuses) is increasing. Proposals are now accepted only through electronic submission. Graeme Smith constructs the 3-m schedule.

Lick Optics: A regular cleaning and evaluation/monitoring program of all optics has begun. The Prime Focus Corrector was recoated for the first time in 16 years with the Santa Cruz hardened Solgel.

APF (Automatic Planet Finder) Update: The telescope and dome signoff occurred on December 4, 2010. The performance is excellent: 0.8 arcsec RMS pointing, 0.5 arcsec 80% enclosed energy (160 nm wavefront error), but no throughput measurements yet. There is a 22-page acceptance matrix document. The spectrometer is being prepared for shipping. Geoff Marcy would like to make the telescope available to the entire UC astronomical community.

Shane Adaptive Optics (AO): With a \$2M MRI grant, there will be upgrades to the Shane 3-m AO system and IRCAL camera, with throughput optimization. Speed gains of more

than a factor of 12 at J , H , and K are expected for point sources, and there will be improved spectroscopic capability. The AO bench will be redesigned with several key upgrades (MEMS deformable mirror) to double the Strehl. Various upgrades are being made to IRCAL, including a new detector, improved mechanisms, and new readout electronics. The refurbished IRCAL will have a 20 arcsec field of view and well-sampled J -band spectra.

Mt. Hamilton Bandwidth Upgrade: For a long time now, there has been a plan to install a Mt. Hamilton microwave link to NASA Ames. The enhanced bandwidth will allow expanded remote use and enable live broadcasts for education and public outreach (EPO) programs. The project is being done with Blue Oak Ranch ARI NSF funding, UCSC ITS funding, and UCO funding. Progress at Ames was very slow, so a temporary link has been established to the UCSC Extension building. The bandwidth is now 40 Mbits per second, a factor of 4 better than T1 links.

Hamilton and Kast Spectrographs: The Hamilton motor controller upgrade was completed at the end of November, improving its reliability and maintainability. The Kast spectrograph was upgraded, but there are still some optical quality issues, such as temporally and spatially variable blue-side focus. Ellie Gates at Mt Hamilton, as well as Graeme Smith and Harland Epps at UCSC, are looking into this, and the spectrograph might be brought back to UCSC for improvements in July 2011.

Public Outreach: Currently, the summer “Music of the Spheres” and Visitor programs are very popular and sell out quickly. Attempts will be made to improve the process and enhance capacity. We would also like to improve the VIP experience.

There are new exhibits in the main building and in the 3-m dome visitors’ gallery. Thanks to Geoff Marcy, many new monitors have been installed, with programmed “shows” about various topics. These have been very popular with visitors, and provide an opportunity to highlight activities throughout the UC astronomy system.

Some steps have been taken to partner with the Exploratorium (in San Francisco); visits were conducted both to Mt. Hamilton and the Exploratorium. Ideas include Lick Observatory webcasts at the Exploratorium, rotating exhibits, a summer teacher institute, and others. There is plenty of enthusiasm for cooperative work, but this will require some energy and persistence for success.

Nickel Telescope: There are some advantages to moving the Nickel telescope to the Astrograph dome, and restoring the excellent 12-inch refractor back to its original location. A source of funding needs to be found.

Gemini Planet Imager (GPI): GPI is the \$20M high-contrast extreme AO imager commissioned for the Gemini-S telescope. The PI is Bruce Macintosh and the Project Scientist is James Graham. After receiving components from a number of labs in North America including the UCLA IR Lab, UCO/LAO (Laboratory for Adaptive Optics) is

under contract to put it all together and conduct end-to-end testing; this will be done in the “Highbay” on the Santa Cruz campus. Assembly will begin at UCSC later this month.

Astronomical Coatings Meeting and NSF Visit: Keck Observatory and TMT representatives were at UCSC on September 21. They looked at possibilities for upgraded coating tanks at Keck, at least for Keck II, to use overcoated silver coatings that have been developed in the Santa Cruz lab. Broad-band antireflective coatings based on Sol-gel appear very promising. NSF representative Don Terndrup recently visited the coatings lab and the LAO; there is some interest in partially “nationalizing” the labs.

UC Awards: UC astronomers continue to garner various awards and accolades. Most impressive is that Jerry Nelson (UCSC) shared (with two others) the 2010 Kavli Prize for astrophysics, in some ways equivalent to the Nobel Prize. Tommaso Treu (UCSB) won the AAS Pierce Prize, Jonathan Fortney (UCSC) the AAS Urey Prize, and Alex Filippenko (UCB) the ASP Emmons Award for undergraduate education.

Director’s Assistant: Mike introduced Paula Towle, his new assistant; she replaced Jacky Leighton, who retired. UCOAC members welcomed Paula to this position and wished her good luck.

LSST: A long-term conversation with the camera PI became more serious in August. The UCO role in camera software is being considered.

Keck Observatory Report: Mike Bolte

Strategic Planning Meeting: The W. M. Keck Observatory (MWKO) took a more active role in the recent Decadal Survey than in the previous one. The Survey recommendations fit in well with WMKO plans: increases in NSF TSIP/ATI, and mid-scale programs. A group of UC, Caltech, U Hawaii, Yale, Subaru, and Keck astronomers met in Oxnard at the end of September to see how the new opportunities fit into the overall Keck strategic plan. Consensus mid-scale program candidates were next-generation adaptive optics (NGAO), which is well positioned to moving into detailed design and construction, and a next-generation radial velocity spectrometer (NGRVS), which may also be a good candidate for a NASA proposal. For new capabilities at WMKO, we are relying progressively more on NSF ATI, MRI, and TSIP.

Laser Guide Star Adaptive Optics (LGSAO): A center launch telescope for Keck II would improve the AO performance. This project is supported by NSF MRI, and it has passed its preliminary design review. First light is planned for September 2011.

Keck I AO IR Tip-Tilt: This is supported by NSF ATI; it dramatically increases sky coverage and improves Strehl by decreasing the contribution of tip-tilt errors, especially in the absence of an optically bright tip-tilt star. The System Design Review is scheduled.

TSIP Proposal: A TSIP proposal for KCWI (Keck Cosmic Web Imager; PI Chris Martin) and NIRES (Near IR Echelle Spectrograph; PI Keith Matthews) was submitted in

September, 2010. It is divided as follows: 55% for KCWI Detailed Design phase and long-lead hardware purchases; 45% for the final phases of NIRES development and commissioning. The total is \$2.25M, corresponding to 22 nights of telescope time.

KCWI is an integral field spectrograph for Keck II at the Nasmyth mount, covering 0.35 to 1.0 μm and having considerable flexibility (field of view from 8" to 30" x 20"; selectable gratings $R \sim 1,000$ to 20,000). It is optimized for very low surface brightness targets and faint emission features, with high sensitivity (throughput > 25%) and precision sky subtraction.

NIRES is a cross-dispersed echelle spectrograph for Keck II at the bent Cass focus. It will provide simultaneous coverage from 0.8 to 2.4 μm in orders 3 through 8, with $R \sim 2700$. The slit will be 0.5" x 15". The hope is to achieve first light in Semester 2011B.

LRIS-R Upgrade Upgrade: Unfortunately, one of two original LBNL devices failed, as did one of the two amplifiers on the good remaining CCD. Three new LBNL devices were obtained and characterized at UCSC. The Keck Science Steering Committee (SSC) decided that a new cryostat should be built and delivered as a plug-in system. The anticipated schedule was for delivery in late February 2011, but then the second CCD in the original upgrade started to fail. So, heroic efforts were made to complete the plug-in system, and it was delivered on November 29, in time for the LRIS run that began on December 3. UCOAC members greatly applauded the rapid and excellent work on fixing LRIS.

Keck Results and Oversubscription: The past 5 years, typically 260-270 refereed papers and 20-25 theses per year have been based at least in part on data obtained with the Keck telescopes. The overall citation rates continue to be very high, but the VLT has caught up to us in this regard.

The Keck oversubscription rate is about 1.8 for each telescope, with some fluctuations and trends. The proposals tend not to be "padded" and are generally of very high quality, so deciding on which projects to approve is difficult.

The annual Keck Science meeting was held in October at UCB, with Geoff Marcy and his staff as the main organizers. Caltech, UC, NASA, UH, Yale, Swinburne, Japan, and NOAO were represented; clearly, the annual meeting provides an excellent opportunity to bring the ever-wider Keck community together.

Flexible Observing at Keck: A growing topic of discussion the past few years, highlighted at the October Strategic Planning meeting, is flexible observing at Keck. This includes Target of Opportunity (ToO) observations, as well as cadence or other *schedulable* time-critical observations (e.g., 0.5–3 hours per night, a few times per semester, with the same instrument). There could be scheduled nights devoted to straightforward service observing, for example, where the WMKO staff obtain the data. (One version of this was implemented in the late 1990s to fill out engineering nights.) For all of these we need to think about the policy, additional operations costs (these might be

significant), cross-institutional possibilities, mainland details (remote observing, etc.), and reliable tracking tools. to make further progress, we need to sit down and think about

The first steps have already been taken. Starting in Semester 2011A, UC adopted a mandatory interrupt policy (up to 1 hour/night for runs that are at least 1 night long). This is limited to the instrument that is currently being used on the telescope. The scheduled observer will be able to briefly negotiate when to take the observations (e.g., to delay until completion of a current exposure, if necessary), but they are discouraged from questioning the scientific merits of these TAC-approved programs. The 1 hour per night is actual clock time from the termination of the scheduled observer's own program and should include overhead for the observer to reconfigure the instrument for both the ToO observation and the resumption of the normal program. The observer of the night is invited to be a coauthor on a resulting paper. [Note: In the past few years, voluntary interrupts (typically 5 per year on the UC side) have resulted in 1.2 papers per interrupt, with a mean time of 1 hour per interrupt.]

One clever idea for enabling ToO or cadence observing is to replace the Keck I tertiary with a deployable system. Prochaska, Nelson, Cabak, and Epps have demonstrated the feasibility of this. Seed money was requested and granted. Regardless of this possibility, we need to sit down and think about the many issues outlined above if we are to make further progress.

UCLA IR Lab Update: Ian McLean

Currently there are four main projects, as follows.

(1) MOSFIRE, a 0.97–2.45 micron camera and multi-object spectrograph for the Keck Observatory. PI Ian McLean. It is currently preparing for Cool Down #8. The pre-ship review will be around Feb. 17, 2011. First light should occur in May 2011.

(2) GPI, a 1–2.5 micron extreme AO camera and integral field spectrograph for the Gemini South 8-m telescope. The overall PI is Bruce Macintosh (LLNL); James Larkin (UCLA) is the PI for the infrared spectrograph. It is currently in final testing, and will be shipped to UCSC in January or February 2011.

(3) IRIS, a 1–2.5 micron AO camera and integral field spectrograph for the 30-m telescope. PI James Larkin (UCLA); Co-PI Anna Moore (Caltech). It is in the conceptual design phase; they hope to start the preliminary design review phase in Spring 2011.

(4) FLITECAM, a 1–5 micron camera and grism spectrometer for NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA). PI Ian McLean. There have been 8 observing runs with it at the Lick 3-m telescope. I will be delivered to SOFIA in July 2011.

New possible projects, in 2011 and beyond, are as follows.

(1) NIRC2 Polarimeter for Keck. The PI is Mike Fitzgerald, a new assistant professor at UCLA. The Keck SSC approved this project and an NSF ATI proposal was submitted (\$650k, with UCLA as the lead and subcontracts to Caltech and WMKO).

(2) OSIRIS Grating Upgrade. The PIs are James Larkin (UCLA) and Shelley Wright (UCB). An NSF ATI proposal has been submitted.

(3) NIRSPEC Detector Upgrade Study. The PI is Ian McLean. This is a Keck-funded study of the feasibility of converting from InSb to HgCdTe + ASIC.

(4) NIRSPEC Cal Unit Upgrade Study. The PIs are Peter Plavchan (JPL) and Mike Fitzgerald (UCLA). Two separate funding proposals were submitted to JPL; want to study the possible addition of a gas cell, a laser comb, and a fiber scrambler with the goal of achieving < 1 m/s radial velocity precision in the near-IR.

In summary, the UCLA IR Lab is very busy. All of their big projects are ending, they have commissioning coming up, they still support their deployed instruments, and they have several studies and upgrades proposed and/or funded. However, 2011 will be challenging, and they have already had to reduce staff by two people due to limited funding. UCO support is important, especially during transitions between projects.

TMT Update: Mike Bolte

Progress: Much activity continues on the telescope controls, including the actuators and edge sensors. One segment of the primary mirror has been completed and mounted to the passive and active support structure. Construction of Type #2 and Type #82 segments is continuing at Tinsley/ITT. Canon (Japan), NIAOT (China), and GOAL (India) are all investigating parallel processing. The E-ELT has very similar segments and is developing an independent supply chain.

The early instruments will be IRIS (see description above) and MOBIE, a wide-field multi-object spectrograph (PI: PI: Rebecca Bernstein; R~1000, 2,500 and/or 5000, and 8,000).

Site: The final EIS (environmental impact statement) was signed by Governor Lingle on May 20. The “challenge period” expired in August with no challenges! The Conservation District Use Application (CDUA) was approved by the Mauna Kea Management Board (MKMB) on September 1; it was then submitted to the Department of Land and Natural Resources (DLNR). There will be public hearings on Dec. 2/3. The CDUA decision is likely during the January 2011 Board of Land and Natural Resources (BLNR) meeting.

Astro2010 Decadal Survey: The Program Prioritization Panel for Ground-based Optical/IR astronomy identified a giant segmented mirror telescope (GSMT) as its #1

priority for the coming decade. The capabilities were deemed “transformative” over a broad range of science and well matched for addressing high-priority frontiers in astronomy and astrophysics. There is also synergy with JWST, ALMA, and LSST. However, overall the Astro2010 Committee changed the relative rankings of the GSMT and LSST based on a perception of readiness, including the need to down-select to a single US federally backed GSMT. It is “crucial” to implement both LSST and a GSMT during this decade. Astro2010 recommended NSF participation in a single GSMT, with an “immediate partner down-select for a ~25% federal share.”

In April 2009, a GSMT Community Assessment Review was sponsored by the NSF. Several relevant conclusions are as follows. (1) “The TMT project has made outstanding progress during its design and development phase and is now poised to begin construction.” (2) “Project management planning, team coordination, PM controls, cost estimating, risk management, forecasting, scheduling, and documentation configuration control are all exemplary.” (3) “The committee found that the design presented for the TMT is sound in almost all areas and that the team has completed its design and development stage successfully, essentially placing it at a PDR level consistent with the NSF MFREC process.”

However, we must be realistic when considering US science funding priorities. Will the NSF (or AST) budget really double over the next 10 years? Six foci for FY12 Science & Technology funding, as laid out in a joint memo (July 2010) by the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB), are as follows. (1) Sustainable economic growth & job creation. (2) Defeat diseases and reduce health-care costs. (3) Clean energy future. (4) Understand and mitigate global climate change. (5) Improved ecosystem management for sustainability. (6) Technologies to protect troops, citizens, and national interests. The problem is that astronomy does not easily map onto these science priorities, when compared to disciplines such as Earth Science, biological sciences, and engineering.

NSF large-project funding is in a separate (non-Division) line for Major Research Equipment and Facilities Construction (MREFC), but operations funding after construction must come from the relevant NSF Division/Directorate. MREFC approval requires many steps: pass preliminary design review, “compete” with other projects NSF-wide, and start recommended by the National Science Board (NSB) and the NSF Director. Typical annual MREFC funding is ~\$200M, but at that level, no significant wedge begins to appear until FY14–FY15. Given that Astro2010 said LSST first, GSMT second in the MREFC competition, MREFC funding for a GSMT may be some years out. However, we should be prepared for any new opportunities in the MREFC queue, and NSF AST may eventually pay operations costs.

The Operations Model for TMT is based on Keck, with considerations of differences in facilities, shortcomings in Keck operations, and providing a broader array of “services.” The Operations Working Group is studying the “services” questions. The baseline bottom-up model looks slim (104 employees).

Partnerships: In addition to Caltech and UC, a Memorandum of Understanding (MoU) has been signed by Canada, Japan, China, and India. There have been multiple trips to these countries in order to build relationships, and to qualify labs and companies. We need to agree on a complex distribution of work in each country. The plan is to submit a coupled proposal to all sponsors by the end of 2011. NSF plays an important role, in part because it is important for some of the other countries to see that TMT is officially supported by the US government. Jim Ulvestad, the new NSF AST Director, is quickly learning about the project.

Quite sensibly, China and India want to build communities of observers. One approach is to establish a vigorous program of scientific and technical exchanges and collaborations involving UC astronomers, as well as use of the Lick and Keck facilities.

SASIR Update: Mike Bolte

This is a project to build a 6.5-m infrared telescope at San Pedro Martir in Mexico (Baja California). There will be a 0.5 gigapixel camera with *Y* through *K* filters, and a 1° diameter field of view. The basic idea is to conduct a super 2-MASS-like survey with a time-domain component for transients and variable phenomena.

The PI is Josh Bloom (UC Berkeley); major contributions are also being made by X. Prochaska (UCSC) and Enrico Ramirez-Ruiz (UCSC). The project is a collaboration between UNAM, UC, INAOE, and the University of Arizona (UA); MoUs are circulating. Some funding is coming from Mexico (CONyCT) for the telescope. An NSF ATI proposal for SASIR camera development has been submitted. Rebecca Bernstein (UCSC) is getting involved in the optical design of the SASIR camera.

Keck Time-Assignment Committee and LMAPs: Mike Bolte

Bolte discussed the TAC process. The Galactic and Extragalactic TACs meet on two separate days. All proposals in either TAC are read and graded by everyone (grading criteria are posted on the UCO website). The lead reviewer for each proposal summarizes the proposal at the meeting, and a discussion follows, with possible changes in grades and nights by individual TAC members. A real-time ranking for each telescope is available during the meeting. Bolte is a member of both TACs, but his primary role is to make sure the considerations are fair, the evaluation is technically competent, and the correct procedures are followed. TAC membership is staggered, with a given member typically serving for three years.

There is a way to support large programs extending for more than one semester, carried out with multi-year approval at the beginning. An LMAP is a program with well-defined goals that from the outset clearly requires a large number of nights for completion. The program is not to be open-ended, but must have a well-justified total number of nights required for the complete project. Thus, LMAPs will generally be directed toward obtaining a high quality, coherent, homogeneous dataset that will allow scientific

questions of major importance to be addressed in a thorough, systematic manner. No more than 30% of the UC Keck time will be devoted to LMAPs. It is expected that LMAPs will generally involve the collaboration of a fairly large group of UC PIs.

UCO Review: Steve Beckwith, Jenny Gautier, Arti Garg

Planning is underway for a full review of UCO in 2011. Steve Beckwith (Vice President of Research and Graduate Studies [VPRGS], UC Office of the President) and his associates made a presentation about the review to UCOAC members. There was considerable discussion; however, only the main points made by UCOP are summarized, for the benefit of the UC astronomical community.

UCO is one of three Multi-campus Research Units (MRUs) excluded from last year's MRU competition, with the expectation of an independent review (joint senate/administration MRU working group). The review needs to compare the basis for support as a system-wide priority similar to the MRPI competition. UCO is four years beyond its 5-year review cycle; it was last reviewed in 2001. New system-wide proposals (e.g., TMT) may require system-wide resources for support. Thus, UCOP needs input from the astronomy and astrophysics (AA) community on the best way to support astronomy in a period of limited resources.

The Charge to the review committee is as follows. (1) Review the management of the UC Observatories and advise on how effectively UCO fulfills its stated mission, meets its goals, manages its operations, and responds to or helps set system-wide priorities in astronomy and astrophysics research. (2) Assess the quality and performance of the UC Observatories, its current programs, collaborations, facilities and accomplishments. (3) Assess the optimal way for UC to determine its system-wide priorities for its astronomy and astrophysics research community across the multi-campus system, how it may invest system-wide funding to address these priorities, and how well the current investment addresses UC's needs. (4) Assess the likely future requirements for UC investment in astronomy and astrophysics in the next decade and advise on what combination of resources, facilities, and funding structures will be needed to meet these requirements.

The role of the UC Office of Research and Graduate Studies (ORGS) is as follows. VPRGS Steve Beckwith calls for the review and sets the charge, receives final reports and recommendations from the review team and comments from the Academic Senate, makes a final recommendation to the President, and forms an action plan for implementation. UCO Review Coordination is handled by Jenny Gautier (Deputy VPRGS) and Arti Garg (ORGS Analyst). They support the review, including gathering data and serving as interface to campuses and UCO shared governance; they also coordinate the review team's agenda and manage logistics of the review, including staffing review team meetings.

The procedure will be as follows. (1) Solicit input on the review process (late September). A letter was sent to 10 department chairs and deans with the draft charge and

description of goals; responses summarized below. (2) Gather data for the review (underway) to define the UC astrophysics community, define the UCO user community, examine quantitative indicators including publications and grants, and provide administrative details for the review committee (UCO budget and staff, system-wide projects, UCO system-wide support efforts).

Nine responses to the letter were received (6 Chairs, 2 Deans, 1 faculty group). There is overall positive feedback for UCO, including support of Lick and Keck for current UC astrophysics and support for TMT. There is a desire for input from campuses; suggestions include meetings, a survey, and a “blue ribbon” panel on system-wide priorities. The review should examine the overall UCO governance structure, the multi-campus impact of UCO, and the long-term sustainability of the labs.

Based on the letters, the UCOP has learned that overall, the UC astrophysics community is supportive of UCO. The review should be comprehensive and include all of UCO’s activities and operations: (1) Does the UCO mission, as stated, sufficiently define the full scope of UCO activities and responsibilities? (2) Are changes to the UCO governance structure needed? (3) Are the UCO labs maximizing their potential? The review should include objective data to understand the scope and strengths of the UCO program and the overall UC astrophysics community.

The review process will take half a year to a year. Campus data are being gathered but will need campus verification. These data include faculty and student lists to define the UCO user community and the broad astrophysics community, publication lists, and lists of contracts and grants. If you wish to contact Steve, Jenny, or Arti, here are their email addresses: Steve Beckwith (steven.beckwith@ucop.edu), Jenny Gautier (jenny.gautier@ucop.edu), and Arti Garg (arti.garg@ucop.edu).

The open meeting was adjourned at 5 pm, and an Executive Session was held.

These minutes were provided by UCOAC Chair Alex Filippenko.