

MINUTES OF THE UCOAC MEETING  
UC Santa Cruz, 9 October 2009

Attending at UCSC: Mike Bolte (UCO Director; UCSC), Alex Filippenko (UCOAC Chair; UCB), Aaron Barth (UCI), Gabriela Canalizo (UCR), Gary Chanan (UCI), Burt Jones (UCSC), Lori Lubin (UCD), Claire Max (UCSC), Geoff Marcy (UCB), Jason Prochaska (UCSC), and Rem Stone (Lick/Mt. Hamilton). By video: Mike Rich (UCLA), Tommaso Treu (UCSB). By phone: David Tytler (UCSD) and (part time) Ian McLean (UCLA). In addition, UCO staff Jacky Leighton and Maureen McLean attended.

**Introduction:** Alex Filippenko

Filippenko thanked everyone for their presence. Attendees should provide updates to their campus colleagues and discuss issues with them, bringing new matters to the attention of Filippenko and Bolte. He also mentioned that we should soon organize a joint meeting between the UCOAC and the Caltech Optical Observatories Council.

**Report from UCO:** Mike Bolte

**Topics covered:** Kast spectrograph, remote observing at Lick, annual graduate student retreat, automatic planet finder, celebratory event, Kepler and Lick Observatory, NSF ATI and MRI proposals, optical SETI at Mt. Hamilton, public outreach, Lick long-term plan and infrastructure, Lick Observatory leadership, UCO Keck data center, ATI proposals for coatings lab, Gemini planet imager, and SASIR/RATIR.

*Kast Spectrograph:* The Kast spectrograph on the Shane 3-m telescope was brought to the UCSC campus for cleaning, recoating optics, and upgrading motors and software; many thanks to Graeme Smith and others who worked hard on the project. The upgrade was funded by a gift from Bill and Marina Kast. There is a new blue-side CCD. We would like to replace the red-side CCD with a LBNL deep-depleted device, but funding is insufficient at this time.

*Remote Observing at Lick:* At the Shane 3-m telescope, about one third of the use in 2009 was remote. Filippenko commented that remote observing is great in allowing students to learn how to observe because it is relatively inexpensive and it allows better student schedule management. He suggested that we make Shane telescope observing available to advanced undergraduates; there were no substantive objections.

*Annual Graduate Student Retreat:* The first two annual three-day retreats at Mt. Hamilton for new UC astronomy graduate students were held in September and October (paid for by the Davidson Fund). Support astronomers explained how to use the 3-m and 1-m telescopes, and covered other topics. A total of 35 students attended; feedback was very positive.

*APF (Automatic Planet Finder) Update:* The telescope (from EOST) was installed on April 21. The primary mirror was aluminized and installed five days later. The dome was finally successfully weatherproofed, after significant work by UCO. On June 11, Ken Johnson from the USNO came out for signoff on the basic telescope/dome functions. However, the UCSC-EOST contract is independent of this and not yet signed off. A new secondary mirror is being fabricated to work with the existing primary mirror to achieve the desired back focal length. Tuning, alignment, and documentation still need to be completed, as does the spectrometer. First light for the telescope system is expected by the end of the year. Marcy commented that much work will be necessary once the spectrograph and telescope are operational to get to a precision of 1 m/s.

*Celebratory Event:* 2009 is the 400<sup>th</sup> year of Galileo's first use of the telescope (and thus has been designated world-wide as the "International Year of Astronomy"), as well as the 50<sup>th</sup> anniversary of the Shane 3-m telescope. An evening event for donors and special friends was held (for a charge) on September 26 in the main building. Geoff Marcy gave a talk on future opportunities with the APF and prospects of finding Earth-like planets with the Kepler satellite. The first "James Lick award" was presented to Ken and Gloria Levy for their important financial contribution to the APF.

UCOAC members agreed that there should be an annual gathering of this type. However, a proper celebration of the scientific achievements of the Shane telescope should also be held sometime in the next year. There will be a staff event in Spring 2010, but something larger would also be desirable.

*Kepler and Lick Observatory:* The Kepler satellite was launched in March and started doing science on May 17. There are significant follow-up opportunities for the APF and the Shane telescope (with the Hamilton spectrograph).

*NSF MRI and ATI Proposals:* UCO recently submitted two proposals to the NSF. The ATI proposal for laser uplink correction was not funded. The MRI-1 proposal for upgrades to the 3-m adaptive optics (AO) system and camera was funded (\$2M). The speed gains should exceed a factor of 12 at *J*, *H*, and *K* for point sources.

*Optical SETI at Mt. Hamilton:* An OSETI instrument was built and used at the Nickel telescope for several years a long time ago; it was sensitive to nanosecond-scale pulses with 3-way coincidence discrimination. Frank Drake has received initial donor funding to build a dedicated OSETI telescope in the Crocker or Astrograph domes. Seven (or more) 16-inch telescopes would independently scan the same field. However, various issues are involved in upgrading the building and dome.

Max asked who would take the lead in data analysis and generally be in charge of the project. Stone replied that Drake would be the PI, at least for the time being.

*Public Outreach:* UCO is trying to partner with the Moore Foundation Bay Area Science Centers. Bolte spent the day at the Moore Foundation on May 28<sup>th</sup>. A Moore Foundation event was planned for Lick Observatory in October, but it was cancelled due to a change

in plans of some key MF people. Among the projects to be targeted for funding are building upgrades (the main building), improved venue for public outreach, science teacher programs, etc.

*Lick Long-Term Plan and Infrastructure:* Filippenko once again suggested that the Lick Observatory long-term plan be sent around again and finalized, with subsequent distribution to the UC astronomical community; over a year has passed since the draft was written. UCOAC members agreed.

*Lick Observatory Leadership:* Rem Stone will be retiring completely at the end of the year. Burt Jones is on recall until June 2010, but would be happy to finish before then. There have been having meetings with the staff to help define the Lick Observatory Operations Manager position. UCOAC input was solicited, and there was a general discussion of the job title and the desired qualifications.

*UCO Keck Data Center:* The general idea is to have central Keck data storage as well as central data-reduction pipelines. One could download data and retrieve reduced spectra; see <http://www.ucolick.org/~holden/datareduceset/index.html>. The first steps have been taken in the form of a WWW interface, as well as DEIMOS and ESI initial pipelines. Beta testing is being done at UCSC; a wider release is anticipated in Spring 2010. Brad Holden has been doing most of the work with assistance from Jason Prochaska (UCSC), NICS, and CARA staff.

There was a discussion of (a) whether to archive only raw data with reduction programs, or to also reduce and save the data, and (b) the data rights policy. The consensus was that both items need further discussion, and will be put on a future agenda.

*ATI Proposal for Coatings Lab:* Drew Phillips led the effort on a proposal for significant upgrades to the coating tank. There will be a matrix of experiments with materials and processes for enhanced/protected silver reflective coatings. Coatings for transmission optics (e.g., Solgel) will also be examined closely.

*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. 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." Components will start to arrive in February 2010.

*SASIR/RATIR:* Josh Bloom (UCB, via video link) and Jason Prochaska (UCSC) presented a summary of SASIR, a project to build a 6.5-m infrared telescope at San Pedro Martir in Mexico (Baja California). It is a collaboration between UNAM, UC, INAOE, and the University of Arizona (UA). 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. There was a mirror-casting event at Steward Observatory in August, with quite a turnout from Mexico as well as the UA President. Design funding proposals are pending.

RATIR is a nice test case for SASIR; it is a multi-armed optical/near-IR robotic camera to be installed in an upgraded 1.5 m telescope at San Pedro Martir. Funded primarily by Goddard/Mexico for follow-up observations of *Swift* gamma-ray bursts and other transient sources, the instrument is being built at Berkeley and Goddard; it has a very short fuse.

Rich asked if there would be a spectroscopic component on SASIR – only perhaps for a second-generation survey. Filippenko asked if there would be a guest investigator (GI) program for SASIR or RATIR. The reply was only for SASIR; data would be available for partners immediately and for the world after some period, with no separate GI program.

### **Keck Observatory: Mike Bolte**

**Topics covered:** Keck usage, LRIS-R upgrade, MOSFIRE, Keck-1 laser, NGAO, new NSF opportunities, Keck Cosmic Web Imager, Keck strategic planning, deployable Keck-1 tertiary mirror, and Keck scientific impact.

*Keck Usage:* Both telescopes are now oversubscribed by about the same amount, roughly a factor of 1.4–2.0, fluctuating among the semesters. K2 used to be substantially more oversubscribed than K1. Proposers request reasonable, modest amounts of time. About 90% of the proposals are for excellent science on productive programs, yet few can be awarded sufficient time and some are rejected despite their relatively high quality.

*LRIS-R Upgrade:* The LRIS-R upgrade on K1 was successfully completed in June. Connie Rockosi and the entire team did an excellent job. Unfortunately, some troubles with one side of the CCD array were found during a recent observing run. The problem is likely to be a component inside the dewar; it will probably need to be fixed at UCSC.

*MOSFIRE:* There has been good progress, but also some delays due to outside vendors. The optics have been completed, and the CSU was completed, cold tested, and installed last week. First light is projected for June 2010, with a runout cost of \$12.39M. This will be a very powerful, exciting new instrument.

*Keck-1 Laser:* The new laser for K1 LGSAO tested out better than specifications, and the laser and center launch telescope are now at the Keck Observatory. OSIRIS will be moved to K1 once the laser is commissioned.

*Next Generation Adaptive Optics (NGAO):* Keck has spent ~\$3M (mostly via TSIP) on designing of a tomographic MEMS-based system to date. A large amount of technical and science-case work has been done for NGAO. The design goals produce significant improvements to the Strehl including correction at red optical wavelengths, a larger corrected field with much smaller field-dependent variation in Strehl.

The major issue is the high cost. In April 2008, a cost cap was imposed of \$60M (for the AO system and instruments) in *as-spent* dollars; a “built to cost” effort was initiated. The Keck Science Steering Committee (SSC) is concerned about the all-or-nothing aspect of the design, and “putting all the eggs in one basket.” The state of the economy has led to a change in the fundraising strategy: we are now looking for a significant leadership gift in the next year. The possibility of implementing some NGAO aspects on the current AO systems is being revisited.

There was a long discussion on the future of NGAO at Keck. Claire pointed out that the world-wide astronomical community feels Keck has the best AO people. She said it is important for Keck to pick and concentrate on an area of excellence, and AO is one such area. Some UCOAC members expressed concerns regarding the value of Keck NGAO in the TMT era. There needs to be a case for what kind of science programs would be done on each telescope.

To continue, however, funding will soon be needed as a bridge to major future funding. The pros and cons of using part of TSIP were discussed. TSIP funding of \$1.2M (12 nights) would get us to PDR, and it is much easier to sell a project that has reached PDR level. Although there was consensus that NGAO on Keck would help the TMT effort, it was also felt that if this were the major consideration TMT should help with some funding. Marcy and Tytler brought up a concern on the Hawaii-California division of labor and what is appropriate. Several others pointed out that AO differs from other instruments and needs more on-site expertise.

*New NSF Opportunities:* As a result of the stimulus package, \$100M was added to MRI-1; a WMKO proposal for a Keck-2 laser facility was successful. Then \$200M was added to a second 2009 MRI-2; a WMKO proposal (with TMT) was submitted for a new solid-state laser to replace the original .

*Keck Cosmic Web Imager:* Based on a Palomar instrument by Chris Martin, KCWI is a proposed optical imager slicer IFS (integral field unit spectrograph) for Keck. Tyler asked whether this is an instrument that UC really needs. Marcy echoed this, and wondered what the UC community really wants and whom it will serve. There was a discussion of dissemination of the Keck SSC information on KCWI, with a consensus that the instrument could be improved.

*Telescope System Instrumentation Program (TSIP):* We sell 24 nights of Keck time (12 UC) every year in exchange for NSF funds (\$100k/night) through the TSIP program. This has been strategically important to the California Astronomy image in the rest of the US. For 2010, the Keck TSIP proposal is take the KCWI project to PDR (\$1.2M) and to take NGAO to PDR (\$1.2M).

In addition, NASA would like to purchase five HIRES nights for 2010A. This seems like a clear winner for us. No TSIP nights were sold for Semester 2010A, MOSFIRE is unlikely to use four scheduled 2010A nights for commissioning. UC astronomers can compete for the time and have done so very successfully in the past.

*Keck Strategic Planning:* One of the Keck SSC's activities is to periodically update the Keck Scientific Strategic Plan. The 2009 Plan looks at the changing astronomical landscape going forward with the selection of Hawaii as the TMT site, the various large-field photometric surveys underway (Palomar Transit Factory, PanStarrs, WISE, etc.) and the plans for our 8–10-m competition. Topics under discussion to address these changes in the landscape are better multi-object spectroscopy, different approaches to scheduling (time domain, cadence, major programs), major upgrades, and adaptive optics. A final draft of this year's plan is nearing completion and will be distributed soon.

The issues around starting new projects at Keck were discussed. The principle funding sources are TSIP, NSF MRI/ATI, and private funds. But significant resources are needed to put together good proposals. Even when funds are available, much is involved, including a dedicated PI, project management, capabilities for purchasing, design, fabrication, testing, coordination with the Keck staff, and support for Keck operations and maintenance. It is difficult to build new, state-of-the-art instruments.

Keck in the TMT era is another important issue. They will have complementary capabilities, as well as natural niches set by source brightness. The Kecks will serve as “feeder telescopes” to some degree, but they can also be used to concentrate on larger programs or have specialized instruments.

*Deployable Keck-1 Tertiary Mirror:* One clever idea for enabling Target of Opportunity or cadence observing is to replace the Keck-1 tertiary with a deployable system. Prochaska, Nelson, Cabak, and Epps have demonstrated the feasibility of this. An ATI or TSIP proposal will be submitted in the future.

Most UCOAC members thought this is a great idea. There was a discussion on how this could lead to changes in scheduling. Queue-only scheduling did not receive much support, but other models such as having standby observers were also discussed.

*Keck Scientific Impact:* Keck continues to lead the world in terms of number of papers per year per ground-based telescope. The impact of Keck papers is also the highest, with an  $h$ -index of about 112 for papers published in the 1996–2006 interval. Similarly,  $h(t)$  for Keck exceeds that of the VLT, Subaru, and Gemini (in decreasing order of  $h$ ). Keck also has the largest relative number of very-high-impact papers and the smallest relative number of very-low-impact papers.

**TMT Update:** Mike Bolte

**Topics covered:** Progress, site decision, partnerships.

*Progress:* Progress has been good. Many design prototypes are now being built and tested, including actuators, sensors, segment support, deformable mirrors, and segments. The first-generation instruments will be WFOS/MOBIE (Rebecca Bernstein PI, Chuck Steidel PS) and IRIS (James Larkin PI, Betsy Barton PS); IRMS, the TMT version of

MOSFIRE, is on the backburner. There is a much-improved WFOS design, with a higher resolution mode, greater feasibility, smaller volume, and larger wavelength coverage per exposure. It passed the Feasibility Study Review (December 12, 2008) with flying colors. The \$1.2M design phase is underway. However, all instrumentation efforts have been underfunded to date.

*Site Decision:* On July 22, 2009, the TMT Board selected Mauna Kea for the TMT site (specifically, “13N,” which is 500 m lower than Keck and quite far away from the other telescopes). This decision was based on partner synergies, a unique ELT location in the Northern hemisphere, partnership completion, cultural/environmental considerations (the 13N site is less sensitive and less controversial), and some site characteristics (elevation, temperature, atmospheric ground layer; observations and simulations suggest that 13N is a very good site).

Some criteria were established one year ago, and these were met: the OMKM Comprehensive Management Plan (CMP) was completed and accepted (with a proviso that four “subplans” be completed by the end of 2009), “Rule-making legislation” was passed, the draft TMT EIS (environmental impact statement) was submitted in June, and the public comment period on the EIS was completed. Support for the CMP/TMT from the Big Island Community is unprecedented: labor unions, Chamber of Commerce, community organizations, schools, business community, and some former opponents. Especially important is that the Office of Hawaiian Affairs has moved into the support column.

Of course, some risks still remain. There are constant activities in Hawaii at all levels, from state government to meeting with opponents. Special thanks are given to Betsy Barton and Anneila Sargent for stepping in to help with two sets of scoping/comment public meetings.

At  $f/1$ , the dome will not be much larger than a single Keck dome. At  $f/1.75$ , it will be several times larger than a Keck dome. However, at its location (13N), and with the anticipated silver color, the dome will blend in with the mountain and difficult to notice from Waimea or the Kona coast, and invisible from Hilo.

*Partnerships:* In addition to Caltech, UC, and ACURA (Canada), Japan is a participating institution; there are Japanese observers on the TMT Board and Science Advisory Committee (SAC), and on November 11, 2008 the MOU was signed. China and India are getting more serious; there have been visits to headquarters and to the two countries. Brazil will visit December 2–4, 2009.

A “Partnership Principles” document is under development to determine how specific contributions map to telescope time and governance, how work packages get distributed and are valued, and many other legal details. Recognition of leadership, initial risks, and early capital (time value of money) will be part of the agreement. The UCOAC expressed the view that 20% for the UC share is a great goal.

## UCO Budget Cuts: Mike Bolte

The budget cuts to UCO have been substantial: \$350k from FY09, and an additional \$950k from FY10, plus participation in the furlough program. These are largely permanent cuts, so our response must be long term. This is a good opportunity to identify the most important core functions for the future and make appropriate adjustments.

Core UCO activities are to (a) initiate and enable major new initiatives such as the TMT, (b) develop new Keck capabilities and support Keck operations (e.g., instrument proposals, business functions, management, design, fabrication; also mainland observing), (c) develop and operate new capabilities at Lick Observatory in support of its research and education mission, and (d) have a research center for astronomy in UC, which is crucial for having the credibility and leadership to carry out the above activities.

The planning principles are as follows: (a) preserve essential functions for development of TMT and Keck capabilities (Laboratory for Adaptive Optics; cutting-edge instrumentation *design* for TMT; instrumentation *design and fabrication* for Keck; astronomical coatings development; astronomical detector development; support of TMT technology development, engineering, rapid prototyping, and testing), (b) preserve essential functions for providing system-wide access to astronomy facilities (remote observations; time assignment and telescope scheduling; UC astronomy data center), (c) preserve essential functions for providing infrastructure and technical expertise that allow UC faculty initiatives to be possible (e.g. APF, GPI, OSETI), (d) preserve essential function for compliance with safety, business, and administrative requirements, and (e) preserve national/international scientific profile for research.

At UCO, there are 15 tenured faculty scientific staff, 10 PhD-level scientific staff, 20 technical/engineering staff, 18 business office/administration staff, and 22 Mt. Hamilton staff. In addition, UCO provides funds when appropriate outside of UCSC in the UC system (e.g., summer salary, or class buyout for instrumentation work).

Identifying options in response to the budget cuts is not easy. Possibilities include higher efficiency, streamline operations at Mt. Hamilton (see below), fewer faculty, general downsizing, reduce fabrication capabilities, increase number of federally funded projects, and reduce unfunded Keck support. However, we need still keep our sights high.

Specifically, at Mt. Hamilton, the following are under consideration: reduce frequency of instrument changes (including no weekend or holiday changes), including not offering the least in-demand instruments PFCam and the Gemini infrared camera for 2010A when we have UC furloughs reducing available workforce, close the Crossley telescope, less well-optimized scheduling, increase response time for night-time problems (reduce on-mountain staff, correct problems with UCSC staff the following day), phase out astronomer visits to the mountain except for training (i.e., remote and robotic use only), shutdown during the months having the worst weather months (no observing), and charge



for non-UC use of the telescopes. However, we want to protect the core science capability, and retain (or enhance) education and graduate training capabilities.

UCO faculty and staff are participating in the furlough program. Represented staff (members of unions) present some challenges. There is a UC, UCSC, and UCO principle that furlough salary savings will come out of salaries. For represented staff, the options are that they join the START program or have temporary layoffs. For Mt Hamilton scheduling, it looks like we can accommodate the temporary layoffs without closing the telescopes.

Ironically, in this time of furloughs and budget cuts, we really should be *growing* to take advantage of many opportunities such as NGAO, Lick 3-m AO, TMT instrumentation, K1 deployable tertiary mirror, KCWI, SASIR, etc. This is a good time to be bold, but we will require a different ratio of state-funded to soft-funded activities.

Both Rem Stone and Burt Jones are retiring. A new Lick Observatory Director of Operations is needed. The broad consensus from Mt. Hamilton staff is that we need a mountain leader with management, facilities, and public outreach skills; scientific leadership can be provided by the UC community, and coordinated from UC Santa Cruz. UCOAC members discussed the required qualifications and the job title/description.

There will be a major review of UCO from the UC Office of the President in late 2009 or early 2010, but details have not been announced yet.

**Data rights and broken collaborations:** Mike Rich

There was a long discussion on the draft proposal by Mike Rich on how to deal with broken collaborations and data rights. The consensus was that the draft document was too long and tried to cover too many situations. Rich agreed to take the UCOAC comments into consideration, and return with a more concise policy.

The meeting was adjourned.

These minutes were provided by UCOAC Chair Alex Filippenko.