

MINUTES OF THE UCOAC MEETING  
UC Santa Cruz, 26 May 2009

Attending at UCSC: Mike Bolte (UCO Director; UCSC), Alex Filippenko (UCOAC Chair; UCB), Aaron Barth (UCI), Rem Stone (Lick/Mt. Hamilton), Burt Jones (UCSC), Jerry Nelson (UCSC), Gabriela Canalizo (UCR), Mike Rich (UCLA), and Ian McLean (UCLA). By video: Alison Coil (UCSD), Lori Lubin (UCD), and Tommaso Treu (UCSB). By phone: Claire Max (UCSC).

**Introduction:** Alex Filippenko

Alex thanked everyone for attending on short notice. The meeting had been delayed for a few months due to complex schedules. In the future, we will try to set the dates much farther in advance. A new system has been implemented, such that each UC campus will have at least one UCOAC member and at least one alternate, to improve meeting attendance and campus representation. Attendees should provide updates to their campus colleagues and discuss issues with them, bringing new matters to the attention of Alex and Mike.

**Report from UCO:** Mike Bolte

Topics covered: Kast spectrograph, APF update, Shane 3-m facilities update, summer 2009 celebrations, Kepler satellite and Lick Observatory, graduate-student workshop, NSF proposals, public outreach, optical SETI at Lick, and the Lick long-term plan.

*Kast spectrograph on the Shane 3-m telescope at Lick Observatory:* It has a new blue CCD and many new features. Installation is complete but debugging is still on-going.

*APF (Automatic Planet Finder) update:* This has been a long saga. The telescope (from EOST) was installed on April 21. The primary mirror was aluminized and installed five days later. There remain some dome weatherproofing issues. First light will be in mid-June. Ken Johnson from the USNO will come out for signoff on the basic telescope/dome functions. A second secondary mirror will be polished to work with the as-built parameters of the primary mirror to achieve the desired back focal length. Also, full-time work has restarted on the spectrometer.

*Shane 3-m update:* The new kitchen in the dome is finished, and the 3-m control room has been remodeled (providing much more space).

*Summer 2009 celebrations:* 2009 is the 400<sup>th</sup> anniversary of Galileo's use of the telescope (and thus has been designated world-wide as the "International Year of Astronomy") and the 50<sup>th</sup> anniversary of the Shane 3-m telescope. On September 26 there will be a special evening event at Mt. Hamilton for donors and friends.

*Kepler and Lick Observatory:* The Kepler satellite was launched a few months ago and started doing science on May 17. There are significant follow-up opportunities for the Shane telescope with the Hamilton spectrograph. A proposal has been submitted to the Kepler team for funding to implement a new CCD and dewar. Geoff Marcy and Gibor Basri intend to request about 25 nights in the “B” semester during the next four years, for follow-up observations of Kepler targets. Mike believes this is a great opportunity.

Discussion: There will be thousands of objects to monitor. The APF (when it is ready) and the 3-m Hamilton spectrograph will both be needed. UCOAC members agreed that the time is needed now to begin follow-up observations. The new CCD will probably be a new 2k x 2k from Fairchild. The iodine range (~5200 Ang) is a good match to the Fairchild CCD, but it dies out in the red beyond 7000 Ang.

*Observational Workshop for UC Graduate Students:* Planning is completed, and announcements going out. The limit is 20 students per session. Priority will be for 1<sup>st</sup> and 2<sup>nd</sup> year students. Individual student selection is by the home campus. All costs will be covered by the Davidson fund.

*MRI and ATI 2009:* UCO submitted two proposals to the NSF. For the ATI the proposal is for laser uplink correction. MRI-1 is for upgrades to the 3-m adaptive optics (AO) system and camera. The speed gains should exceed a factor of 12 at *J*, *H*, and *K* for point sources. This is another part of the general theme to bring a number of federally funded projects to Mt. Hamilton.

*Public Outreach:* UCO is trying to partner with the Moore Foundation Bay Area Science Centers. Mike will spend the day at the Moore Foundation on May 28<sup>th</sup>. They have a new president. There is a Moore Foundation event planned for Lick Observatory this summer. Among the projects to be targeted for funding are building upgrades (the main building), improved venue for public outreach, science teacher programs, etc.

Discussion: UCOAC members thought this is a great idea.

*Optical SETI at Mt. Hamilton:* An optical SETI 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 a donor to pay for the construction of a dedicated optical SETI telescope in either the Crocker or Astrograph domes. Seven (or more) 16-inch telescopes would independently scan the same field. Various issues are involved in upgrading the building/dome.

Discussion: Again, this is a potentially high pay-off project with small risk, consistent with some other projects on Mt. Hamilton. At the moment, some very limited UC resources (engineering people) are needed, but no long-term commitment has been made. *Lick Long-Term Plan and Infrastructure:* Alex suggested that the Lick Observatory long-term plan be sent around again and finalized, with subsequent distribution to the UC astronomical community; nearly a year has passed since the draft was written. UCOAC members agreed.

Alex also mentioned that many of the houses at Mt. Hamilton look rather shabby and need a new coat of paint. Claire agreed; from the point of view of getting donors, the cosmetic appearance of the houses on the mountain is a serious drawback. Rem pointed out that some real structural work is needed on some houses, and Burt mentioned that toxic-waste management is a major issue. Jerry asked whether the campus facilities could cover the cost. Mike said that we already get facilities support, so UCO is responsible for Mt. Hamilton. We would need to use external consultants.

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

Topics covered: TACs, LRIS-R, NGAO/TSIP, NSF programs, and Target of Opportunity observations.

*UC Keck TACs:* The ideal TAC member is impartial, very knowledgeable, and responsible. The ideal TAC meeting is fair, with an in-depth discussion of each proposal. We now have a Galactic and an extragalactic TAC. Mike is updating TAC membership on a shorter timescale, which is probably a good thing.

The oversubscription rate has been changing; in 2006A it was 1.44/2.38 (K1/K2) whereas in 2009A it was 1.67/1.91. For 2009B it was 1.39/1.61.

*LRIS-R:* LRIS-R was delivered and installed at K1 last week, and the first science observing night is scheduled for mid-June. Ironically, Natalie Roe at LBNL has reported that they now have a 4k x 4k deep depletion device! Could we afford to build a replacement dewar using existing spare boards? The total cost would be about \$250k. The cost of the chip itself would be \$50k.

*Next Generation Adaptive Optics (NGAO):* Keck has spent ~\$3M (of TSIP money) on designing of a tomographic MEMS-based system to date. Lots of good technical and science-case work has been done for NGAO, and meanwhile our AO-based community has grown substantially. The idea is to boost Strehl and push into the red/visible range. The NGAO effort is equally based at Keck, Caltech, and UCSC.

The major issue is the high cost. In April 2008, a cost cap was imposed of \$60M (for AO and instruments) in as-spent dollars; a “built to cost” effort was initiated. The current goal is to look for a considerable leadership gift in the next 18 months.

Success criteria for build to cost:

- A compelling case still exists at \$60M.

- A credible technical approach still exists.

- The project has reserved contingency.

The project has reduced the field size, eliminated the deployable multi-IFS instrument, and combined the imager/IFU instrument with no OSIRIS.

Discussion: What should we do? Keep NGAO on life support, slow down the PDR, etc.?

Comparison with JWST and TMT: the former is better at  $K$  but NGAO has higher spatial resolution and should work better at  $J$  and  $H$ . For sure, TMT will win over Keck, but it depends on when TMT comes along.

NGAO has become controversial. It seems that the Caltech community is less enthusiastic about NGAO than UC is, and a large contingent of the UC community is not yet vested in AO-based science.

At Keck, what is the ratio of AO papers per night versus non-AO papers per night? Also, what is the percentage of observers using AO?

Alex pointed out that some donor might find NGAO quite attractive, even if it only wins for 5 years until TMT comes along; it provides “unique” science. However, there is no clear path for a private donor at this level (\$60M) at present. There will be a TSIP announcement of opportunity in July 2009; Mike thinks we could use part of the TSIP proposal to fund NGAO to PDR.

Tommaso asked about the “lost opportunity cost” if TSIP funds go to NGAO instead of something else. Mike said that there are few other proposed projects with an identified, committed PI. A year ago the Keck SSC asked for white papers for instruments; several were submitted, and some studies were done. One project is the Keck Cosmic Web Imager (KCWI), but PI Chris Martin is now extremely busy and this concept has not had much scrutiny. Chris has been tasked with bringing a TSIP-ready proposal and science case to the Keck SSC in their July 2009 meeting. Basically, we don’t have a clear plan for non-NGAO instruments.

Of course, the other opportunity cost is the lost nights (TSIP); on the other hand, providing Keck access to the NOAO community has been very beneficial to us in a number of ways, including community support and perception.

Jerry said that not going forward with NGAO would be dire. Not going after TSIP money might cause a domino effect that could eliminate private donors. Also, there is a danger to us if we “withdraw” from TSIP, abandoning the successful public/private partnership.

Ian pointed out that 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. This could be just what we need to attract a donor.

*New NSF Opportunities:* As a result of the stimulus package, \$100M was added to MRI-1, then \$200M was added to a second 2009 MRI-2. The second round has a \$6M cap, and up to 3 proposals per institution. The deadline is August 10, 2009. There is a 30% matching requirement for most institutions. MREFC got \$400M added and a program called ARI (Academic Research Infrastructure) received an additional \$200M.

## MRI-2 Ideas

We need something credible that is already in the budget. Perhaps do something joint with TMT. Possibilities:

- 1) 25W laser for K2 from Keck/TMT/etc. collaboration: 10x better coupling to Na gives 2x better Strehl; strong NGAO driver; reduces risk for TMT.
- 2) AO-corrected NIR tip-tilt sensor for K1: achieve optimal Strehl to 16 mag, push LGS functionality – 2 mag fainter. Important, but unproven, technology.
- 3) KCWI: Based on successful Palomar instrument, but has to be run out of Caltech, may not be ready in time, and Caltech does not have matching funds.

*UC Target of Opportunity Observations:* This is a good time to revisit our policy and see whether we can become more flexible. Caltech has the ability to bump programs, but of course, they have more telescope time per person so this is easier. Some override time for UC would make us more competitive. This is worth discussing in more detail. Mike will set things in motion in the near future, in time for Semester 2010B proposals.

## **TMT Update:** Mike Bolte

*Instrumentation:* WFOS/MOBIE (Bernstein) and IRIS (Larkin) efforts are underfunded to date. MOBIE passed feasibility review on December 12, 2008; Ian McLean chaired the review. IRIS is in Conceptual Design; an interim review is due in June 2009 with the final review in December. IRMS – a clone of Keck/MOSFIRE for the TMT – is on the backburner for now. Instrument budgets may increase soon to enable MOBIE and IRIS to go to PDR.

*Design prototypes:* Several are now being built and tested. There has been progress on the actuators, sensors, segment supports, and deformable mirrors. A dummy segment with full warping harness is now being tested, and real segments are being built.

*Site selection:* On July 21, 2009 the TMT Board will choose a site for TMT. The lack of a site is impacting fund-raising efforts. There has been steady progress toward making Hawaii (Mauna Kea) a feasible site. A comprehensive management plan has been completed and accepted. Rule-making legislation has passed. Our draft environmental impact statement has been submitted and public comment starts on June 15. The specific site (called 13N) is 500 m lower than Keck and quite far away from the other telescopes. This is a less controversial site for local Hawaiians.

In Chile, the concession for the Armazonas site belongs to a university, but TMT is working directly with the government to get a 50-year lease on the site. The Chilean government has a clear cost or charge for the site.

Discussion: Several UCOAC members thought that the Mauna Kea 13N site might be more humid or prone to fog than the summit ridge due to clouds hanging below the summit ridge. Has this been considered?

Other partners: Japan remains an option; an MOU was signed on November 11, 2008. Contacts with China and India are getting more serious. An NSF non-advocate review (see below) held at the end of April 2009 resulted in very positive feedback to the TMT Project and to the NSF. There was a very strong re-affirmation of UC's commitment to the project by UC President Yudof at the March Council of Chancellors meeting.

**Report from UCLA IR Lab: Ian McLean**

Ian reported that the IR Lab is now entering its 20<sup>th</sup> year. Currently there are four main projects: FLITECAM (ready to ship to NASA when SOFIA is complete); MOSFIRE for Keck (in integration now, second cool-down passed, slitmask unit received); GPI for Gemini-South (in construction phase now, dewar fabricated); and IRIS for TMT (part way through the Conceptual Design phase, due December 2009). UCLA has also completed a search for an instrumentalist and an offer has been made.

**SASIR/RATIR: Mike Bolte**

At the last meeting we agreed to hear from Josh Bloom and Jason Prochaska, but neither of them could attend this meeting. A white paper was submitted to Astro2010, and further input was requested. RATIR, also being built by Bloom's group, is a nice test case; it is a multi-armed optical/near-IR camera. It will be installed in an upgraded 1.5 m telescope at San Pedro Martir; the instrument will be operated robotically. Though funded by Goddard/Mexico for follow-up observations of *Swift* gamma-ray bursts and other transients, RATIR is currently somewhat underfunded and has a very short fuse. The instrument will be built at Berkeley and Goddard.

**UC Funding Situation: Mike Bolte**

UC funding in the post-special-election period is dire. All UC campuses have already had a 10% cut this year. There will probably be another 10% cut on July 1. There is a UCO permanent cut of ~\$100k/year through campus facilities. Additional cuts are likely in the works now. There will probably be a review of the MRU next year by Steve Beckwith in the UC Office of the President.

**Astro2010: Mike Bolte**

The Decadal Survey has grown into an enormous, time-consuming effort. The next step is a meeting of the facilities group in June. Mike and Ed Stone will present their views on TMT, as will ACCORD and AURA. Keck was not invited to present.

**Lick/Keck Archive: Mike Bolte**

Brad Holden at UCO/Lick can generate reduced spectra from data in the Keck archive. What do we want to do with this capability? We could purchase some RAID hardware to store raw data at UCSC. The instruments with pipelines are NIRSPEC, ESI, LRIS, and

DEIMOS. Brad has adapted the existing extraction tools and tried to make things more robust. We need a policy.

Discussion: Jerry mentioned that the Keck instruments should really monitor performance and perhaps this approach to pipelines would make that easier. Perhaps we should draw attention to the existing Lick archive as well. This could be in the UCO Newsletter (which, though infrequent, has been a very good source of information for the UC astronomical community). Mike Rich agreed to investigate the rules and rights for data ownership, and to draft new policies if appropriate.

**Keck White Papers: Mike Bolte**

Last year, the Keck SSC read white papers for potential new Keck instruments or upgrades, and approved three of them for limited funding:

KCWI (Keck Cosmic Web Imager): visible-light IFU using image slicers.

NEDI: laser comb for NIRES or NIRSPEC. High-precision radial velocity spectroscopy in the near-infrared.

MOS at high spectral resolution: Harland Epps came up with a dual VPH design for LRIS-R. It is limited to one wavelength region per night, with daily instrument changes, and thus is not very practical. Perhaps fibers should be revisited.

None of these studies has produced a report yet.

Discussion: is there a way to have UC (in general) benefit from having both TMT and LSST? We know that we need both. UCI is a partner (along with UCD, obviously). It would be a pity to compete for funds.