



Association of Universities for Research in Astronomy

WORKFORCE AND DIVERSITY PROGRESS REPORT

Calendar Year 2011

Dear Colleague,

In 2011, AURA continued its commitment to broadening participation, affirmative action, and a proactive development of the future workforce. This letter is intended to summarize for AURA employees and governance the actions we have taken and to chart our progress in a transparent way. AURA as a large managing organization has an opportunity to directly contribute to this goal.

The AURA Action Plan for Broadening Participation¹ states our commitment to strengthen AURA's role in increasing the participation of:

- *A Diverse Cross-section of Individuals Employed as AURA Staff:* we will strive to achieve a diverse and inclusive collection of individuals and groups who bring varied human characteristics, origins, backgrounds, interests, skill characteristics, and perspectives to enrich the workforce.
- *Future Workforce:* we will orient our outreach programs and partnerships to create opportunities for underrepresented minorities, women, and persons with disabilities for the purpose of increasing the flow of undergraduates, graduates and post-docs into the fields of astronomy and related technologies.
- *Institutions:* we will reach out to institutions that have not had a history of involvement in AURA's activities, especially smaller institutions and institutions with high percentages of underrepresented groups.
- *Geographic Areas:* we will identify and establish a greater presence in geographic areas that have not had the opportunity to contribute to AURA's mission and the overall field of astronomy.

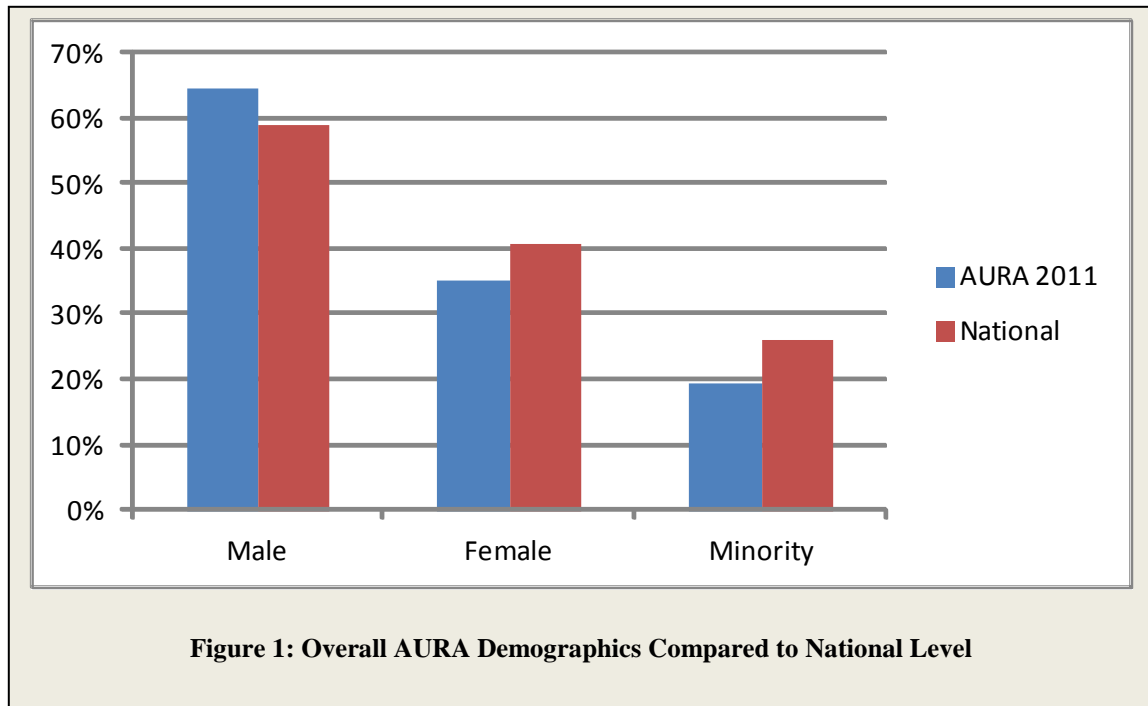
These goals will guide us in achieving the leadership position we desire.

¹ see <http://www.aura-astronomy.org/diversity/actionplan.asp>

AURA Demographics

Over the past several years, AURA has made a concerted effort to validate and track diversity in the workforce of direct employees, the makeup of the collection of individuals from the community that participate in its governance, and in the students we influence in STEM careers.

AURA compares its demographic makeup to the set of organizations which are required by the Equal Employment Opportunity Commission to report under the classification NAIC 54171, Private Sector Physical, Engineering, and Life Sciences². There are over 285 thousand workers in this category, of whom AURA employs about a thousand.



After a slight improvement from 2009 to 2010, AURA overall demographics showed no significant change in 2011. As seen in figure 1, in 2011 women and minorities in AURA lag behind the national percentages for organizations in our category. Compared to the National data, AURA slightly lost ground as the national participation rates increased, from 39 to 41% and 24 to 25% for women and minorities respectively, in this reporting category.

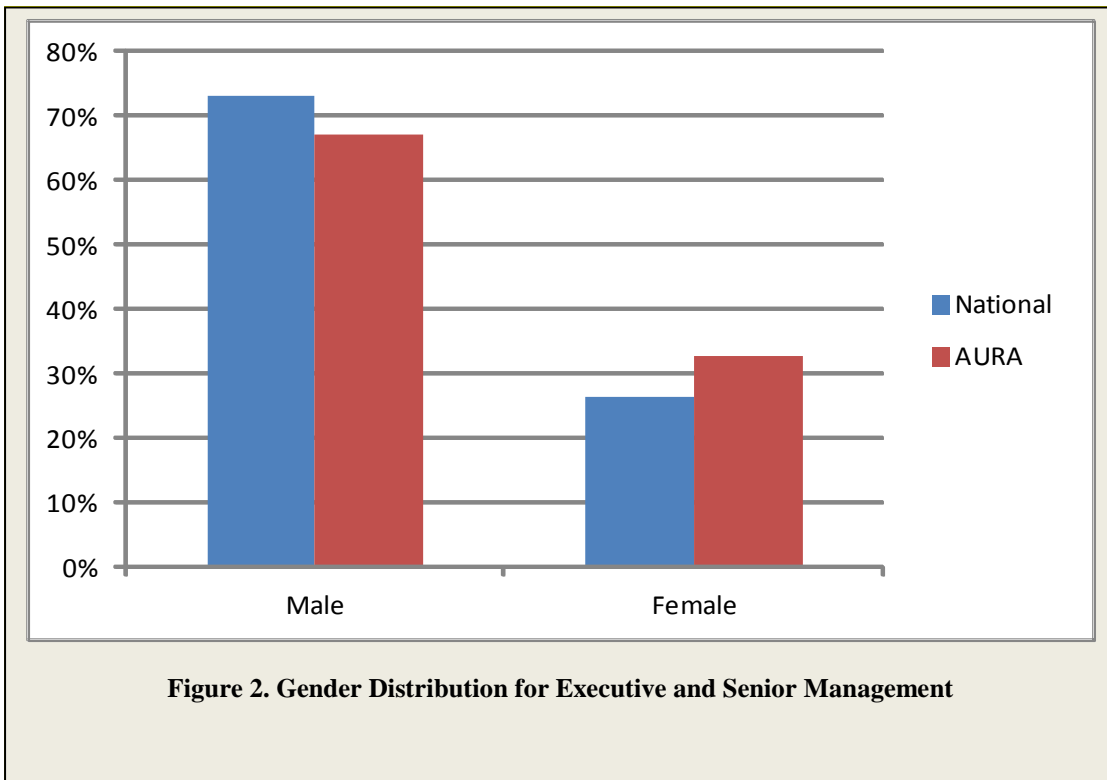
It has been observed that this reporting category is strongly affected by the biological science organizations which typically include a higher percentage of women and minorities. Nevertheless, AURA clearly recognizes that its demographic makeup is in need of improvement.

² See <http://www1.eeoc.gov/eeoc/statistics/employment/jobpat-eeo1/2009/index.cfm#centercol>. Generally, EEOC data lag the current employment picture by about two years.

In tracking demographic trends for underrepresented minorities, it is important to distinguish gender factors as well. Of the 19.5% minority participation rate for AURA shown in figure 1, 8.5% is female and 11% is male. For the national picture, of the 25% shown in figure 1, female and male participation rates are, respectively, 12 and 13%, somewhat more balanced than is the case for AURA.

Since the initiation of these annual reports, AURA has also focused on ensuring that top management ranks receive attention in terms of recruiting and retention of women and minorities. For the highest employment classification, *Executive and Senior Management*, figure 2 shows the gender demographics. This is a subset of the overall comparison in figure 1, and represents about 7% of the AURA workforce. As seen, in 2011 AURA exceeds the national case for gender diversity in management ranks, as has been the case in the past several years.

Over the recent past, about twenty-five percent of astronomy PhD's have been awarded to women. AURA Centers have attempted to meet or exceed this pool average. For Gemini, for example, 34% of the PhD science staff are women³. At NSO, 26% of the science staff are women. For STScI, 18% of the 85 science staff are female⁴. At NOAO, 10 of 41 (or 24.4%) science staff are female.



³ Gemini and CTIO face the added difficulty of luring engineers to areas that are geographically remote where spouses or unmarried partners have difficulty finding employment (or may be forbidden to work, if on a visa), and families with children may have schooling issues.

⁴ STScI has rebounded over the decade in its representation of women. In 2001, out of 73 staff, 11% were women. In 2005, 8% of the 63 science staff were women. Of the 22 staff added since 2005, 10 have been women, resulting in the present balance.

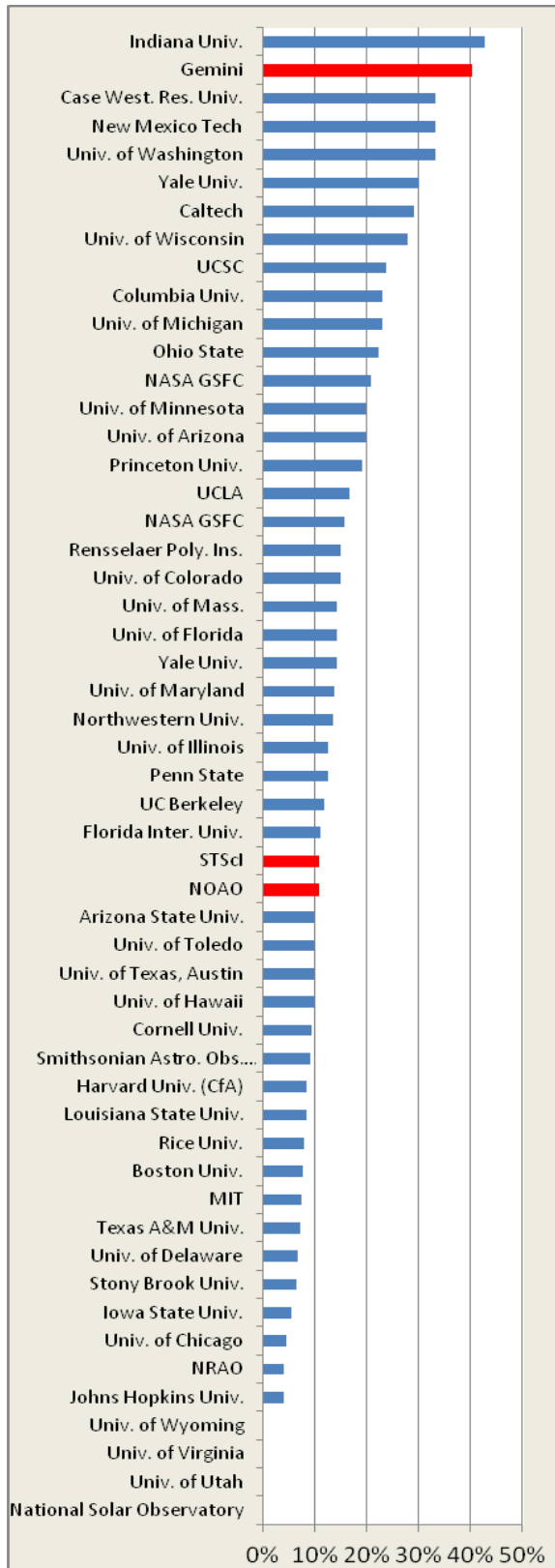


Figure 3. Percent of Tenured Astronomy/Physics Faculty or Staff that is female.

One additional measure of the status of women within the scientific ranks is the percent of tenured staff that are female. Recently, the AAS Committee on the Status of Women in Astronomy compiled a list of major astronomy institutions and the per cent of tenured faculty or staff that were female⁵. Generally larger institutions employ more tenured women astronomers, but have greater difficulty achieving higher percentages. Figure 3 shows the institutions for which data is available and where AURA observatories fall.

Although the overall demographics are difficult to change over the short term, a key measure of future success for AURA centers is recruitment, hiring, and promotions.

- For STScI for 2011, there were 57 new hires, of which 18 were female and 16 were underrepresented minorities. There were also 19 promotions of which 10 were female and 6 were underrepresented minorities.
- For NOAO for 2011 there were 17 new hires, of which 3 were female and 4 were underrepresented minorities. There were also 13 promotions of which 7 were female and 5 were underrepresented minorities (included overlapping categories).
- For Gemini for 2011, there were 24 new hires, of which 8 were female and 14 were from underrepresented groups. There were also 16 promotions of which 4 were female and 6 were from underrepresented groups.

⁵ See http://www.aas.org/cswa/percent_tenured.html

- For NSO, there were 16 new hires, of which 4 were females and 2 were from underrepresented groups. There were 8 promotions of which 1 was female.

Within its governance, AURA has also sought to preserve diversity. AURA’s standing committees are listed on its website, <http://www.aura-astronomy.org/governance.asp>. AURA has sought to maintain at least 30% women and minorities in its governance. In addition to diversity goals, governance choices are sharply constrained by a variety of management, scientific, and other factors. Figure 3 shows the trend over the past decade in achieving greater percentages of women. As seen, in 2011 AURA fell short of its 30% goal. This was primarily due to the addition of a major new oversight committee for the LSST, for which only one female member has been named thus far.

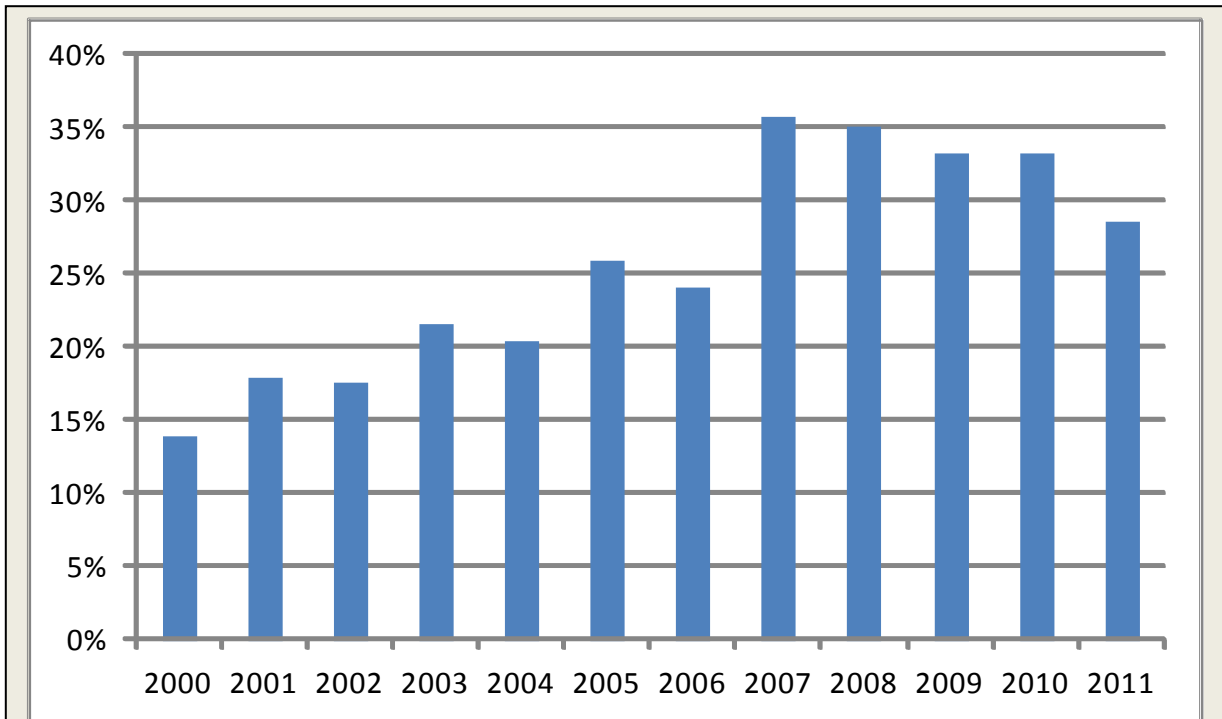


Figure 4: Women in AURA Governance

Gender balance has also been a goal in constituting various AURA level *ad hoc* committees especially for major position searches and appointment reviews. It is well recognized that it is necessary to ensure diversity on a search committee in order to successfully recruit women and minorities, and that a focused effort should be made to ensure the applicant pool is diverse. More recently, AURA has also instituted a policy of exposing search committees to the basic findings on unconscious bias. Guidelines for search committees are included under “Resources” on the AURA website at <http://www.aura-astronomy.org/about/diversity.asp>.

In 2010, AURA successfully conducted a search for the AURA Executive Vice President which led to the appointment of Dr. Heidi Hammel. During 2011, AURA conducted two major searches for a Kitt Peak Associate Director, and a Gemini Director. The latter has not yet concluded.

The following table contains measures of diversity throughout the above two search processes. The Search Committee column contains the number of women and minority members of the Search Committee, the Applicant Pool contains the number of women and minorities recruited for consideration, the final pool is the “short list”, and the Selection indicates whether a woman or minority was finally selected⁶.

Diversity Measures				
	Search Committee	Applicant Pool	Final Pool	Selection
KPNO Director	2 out of 6	10 out of 27	2 out of 5	No
Gemini Director	2 out of 9	1 out of 7	0 out of 3	NA

Since this metric is new, it is difficult to compare with past AURA searches in any meaningful way.

Growing a Future Diverse Workforce

AURA has focused its outreach and education programs to engage underrepresented populations, underserved geographic areas and institutions, and women. At the K-12 level, AURA has sought to provide the seeds of interest in science in general and future STEM related careers. At the advanced student level, AURA institutions offer a valuable research experience that complements academic and career development at all levels and also provides to a growing number of students a familiarity with the operating environment for major public observatories.

K-12 And Teacher Training Activities

NOAO

NOAO maintains a vigorous outreach effort in Arizona and Región de Coquimbo through a portfolio of programs that serve students directly and that provide professional development for teachers and informal science educators (e.g., museum and afterschool program educators). In Chile, a major effort is being made to train astronomy guides for public observatories.

NOAO continues working with various educational organizations on the Tohono O’odham nation. The EPO group is regularly asked to offer both school and after school programs, which they carry out as their first priority. While these activities are difficult to assess, independent positive comments about Kitt Peak’s educational efforts are

⁶ For privacy reasons, this column does not show whether or not an offer was actually made to a woman or minority. In fact, it is many times the case that such offers are made but not accepted.

becoming very common. NOAO held a special Tohono O'odham family night at Kitt Peak in Oct 2011; planning for this began in the spring, and over 700 people attended.

NOAO also continues with an active Project Astro program that includes minority serving schools in the Tucson area. The EPO group has hired a Tohono O'odham student, who attends U Arizona, to assist part time with various educational programs.

Gemini

As an international institution, the Gemini Observatory's educational programming focuses primarily on its local host communities, Hilo and La Serena. For over 5 years, both Gemini sites have trained teachers to execute the Family ASTRO program, which has benefited hundreds of students and their families. Family ASTRO is part of a series of public education programs of the Astronomical Society of the Pacific (<http://www.astrosociety.org/education/family.html>). This program involves training educators in several basic areas of astronomy and physics by means of workshops aimed at "learning by doing" in a family-based environment in which each participating family group learns according to their own skills.

In addition to Family ASTRO and portable StarLab planetaria at both sites, Gemini's flagship local outreach program is the extremely successful Journey through the Universe. Entering its 8th year in Hilo, in 2011 Journey Through the Universe was expanded to Chile under the name Viaje al Universo Chile. Together these two versions of the program, which bring observatory scientists and staff into classrooms for an intensive week of activities, is impacting thousands of students, parents and educators annually. For example, in 2011 the JttU program in Hawai'i resulted in 35 astronomy educators (58 Journey science educators in total) visiting over 6,490 children in 310 classrooms during JttU week. Over 2,600 members of the public attended two Family science events as well.

In 2011 Viaje al Universo was combined with the annual AstroDay Chile program which was founded by the Gemini outreach office. Starting as a mere handful of booths and kiosks from AURA observatories in 2005, this event has grown to host more than 20 institutions from Chile and beyond.

In Hilo the business community continued their ongoing support of the nationally recognized Journey through the Universe program sponsored by Gemini and provided funding and a thank you celebration hosted by both the Hawai'i Island Chamber of Commerce and the Japanese Chamber of Commerce. Hawai'i's State Superintendent attended a Journey day at our local high school and assured the Journey community of the Department of Education's continued support of this flagship Gemini outreach program.

STScI

At STScI, 2011 showed continuing and increasing involvement in key initiatives and partnerships with respect to broadening participation and outreach. The STScI Office of Public Outreach (OPO) spearheaded multiple projects such as our Visions of the Universe exhibit tour and the Micro Observatory Projects targeted at bringing the science of Hubble to underserved communities and students from underrepresented groups. The first programs underwent continued expansion in 2011 and the second, a new initiative, is generating strong response. Another key initiative was Tactile Astronomy supports, OPO's efforts to bring the wonders of the universe to everyone, regardless of their visual ability. Outside of serving a special needs community, this project was identified as one where a cycle of high school interns (female and minority) could be, and continue to be, involved in its development.

The STScI/OPO group was extensively involved in providing professional development experiences for Baltimore City science. STScI maintained significant support of partnerships in STEM education and career development initiatives with Maryland Mathematics, Engineering and Science Achievement, the Maryland Business Roundtable for Education and the Maryland Space Grant Consortium.

The STScI Youth for Astronomy and Engineering (YAE) program, a local community youth outreach program, offered day and evening programs for underrepresented youth and their families. Through a partnership with OPO, as it did in 2010, YAE sponsored a second day long professional development workshop entitled for local middle school educators.

NSO

During 2011 three middle school teachers participated in the NSO Research Experience for Teachers (RET) program. Of the three RET teachers, two were female with one of the females from a middle school on the Navajo Nation in northeastern Arizona. She, in particular, developed five lesson plans based on solar data for use in science and math classes. Each lesson plan is explicit about which State of Arizona education standard is addressed.

NSO originally developed and makes available two educational modules to be used in the classroom at middle- and high-school levels. The Researching Active Solar Longitudes (RASL) project is geared towards improving students' computer and analytical skills in addition to becoming familiar with fundamental solar science. The Data and Activities for Solar Learning (DASL) project provides classroom experience for middle or high school students to study the properties of the Sun's magnetic cycle

Project CLEA (Contemporary Laboratory Experiences in Astronomy) develops laboratory exercises that illustrate modern astronomical techniques using digital data and color images. They are suitable for high school and college classes at all levels, but come with defaults set for use in introductory astronomy classes for non-science majors. NSO provides a module using Global Oscillation Network (GONG) data that allows the student to

measure solar rotation and learn about the difficulties of inferring three-dimensional information from two-dimensional projections.

Project ASTRO is a national program that improves the teaching of astronomy and physical science by linking professional and amateur astronomers with local educators. Each astronomer is matched with an educator in a one-on-one partnership and commits to visiting the educator's students at least four times during the school year. NSO staff participates in the annual Project ASTRO two-day workshop hosted by NOAO and engage in mentoring throughout New Mexico and Arizona.

RASL, DASL, Project CLEA and Project ASTRO can all be accessed through the NSO education and public outreach link at <http://eo.nso.edu/>. NSO is a strong participant in the Southwest Consortium of Observatories for Public Education (SCOPE). SCOPE is a consortium of research institutions in the Southwest that promotes public awareness of astronomy through access and education. This valuable collaboration results in excellent interaction among the public and educational outreach staff of these groups and the NSO.

Advanced Student Activities

Student intern programs directly expose future potential hires to the observatory working environment. Although not formally a Broadening Participation program, the NSF Research Experience for Undergraduates (REU) has been one of the most effective tools used by AURA as well as other qualifying institutions in order to contribute to STEM workforce development through research-based training and education. For STScI and Gemini which are unable to participate in the REU program, comparable active intern programs have been established.

- For NOAO North, the REU program in summer 2011 totaled 6 students: 2 men (both Hispanic) and 4 women. At NOAO South, there were 5 students, one of whom was female.
- At NSO, 2011 saw a class of 6 REU summer students, of whom 4 were female. One female REU student will present a poster paper at the January 2012 meeting of the American Astronomical Society in Austin, TX. The NSO anticipates that 2 or 3 REU students along with one RET teacher will present poster papers at the 2012 meeting of the Solar Physics Division (SPD) of the AAS. At the Las Cruces SPD meeting in June 2011, four NSO REU students presented poster papers of which female students presented three.
- The NSO also actively participates in the NSF's International Research Experience for U.S. Graduate Students. Of the two students in 2011, one was female who was also from a Hispanic serving institution (New Mexico State University, Las Cruces).
- The NSO mentored 8 Summer Research Assistants including 5 (1 female) from the Akamai Program and 3 graduate student SRAs (1 female). One of the Akamai students was just hired as an engineer on the ATST project.
- For Gemini, during 2011 there have been 18 Interns who have gained experience in STEM occupations in the Gemini workplace, of whom 7 were female and 12 were from underrepresented groups.

- For the Space Telescope Science Institute, 12 summer interns were selected, of whom 5 were female. 7 of the 12 identified themselves as being from underrepresented groups. Of the summer students from 2011, one has remained as an intern on a science project and another was recently hired as a research analyst.
- Scientific and HR staff from STScI were invited to participate with a newly formed group at Johns Hopkins University focusing on issues of diversity and equity for postdoctoral research fellows at JHU. STScI and JHU are working jointly on initiatives including child care, climate and unconscious bias.

AURA Centers have also reached out in other ways. On November 18-19, the NSO sponsored a special Akamai Technical Workshop in Maui. This was intended to stimulate interest in engineering careers among alumni of the Akamai Internship Program. The long-range goal for the NSO in the Akamai program is to build the local STEM workforce on Maui in order to achieve a stable reservoir of technical talent available to support ATST operations and on-site instrument development activities.

All AURA Centers have benefitted from the NSF's Partnerships in Astronomy and Astrophysics Research and Education Program (PAARE). Although not directly eligible to submit proposals, AURA Centers have acted as partners in the overall bridge program by providing valuable research experience.

- During 2011 Gemini hosted in Hilo its second student from the Fisk-Vanderbilt Bridge Program <http://www.vanderbilt.edu/gradschool/bridge/>
- During 2010, a Fisk-Vanderbilt student at NSO successfully defended his Masters thesis based on data from the Global Oscillation Network (GONG) program. He was subsequently admitted to the PhD program. He recently submitted the results of his Masters thesis work to the journal *Solar Physics* for consideration for publication.
- At STScI, the Fisk-Vanderbilt graduate who was retained in a temporary position in the Office of Public Outreach after her participation in the 2010 summer program, has now been retained in a staff position as an Outreach Coordinator. STScI is currently considering a second Fisk-Vanderbilt graduate (PhD) for a staff position with the Research and Instrument Group.

Organizational Initiatives

AURA's Workforce and Diversity Committee has continued to explore ways for AURA to enhance its programs to broaden participation, improve the workplace climate, and attract a diverse workforce. In 2011, the Committee met in Sunspot New Mexico.

The Committee explored two major issues which affect not only AURA, but also the broader scientific community.

- In 2011, the NSF published a proposal to revise its merit review criteria, see http://www.nsf.gov/nsb/publications/2011/01_19_mrtf.jsp . On June 30, AURA submitted a formal comment on the criteria as they relate to broadening participation. Appendix 1 contains this comment.
- The Committee examined the NSF proposal to eliminate the Partnership for Astronomy and Astrophysics Education (PAARE) program that has provided minority students to AURA observatories. The NSF has determined that this program is relatively undersubscribed. In response the Committee discussed possible improvements that might make it more successful, for example—
 - Should the program be broadened to include other NSF Directorates?
 - Should the program be broadened to include other disciplines (astro-instrumentation, etc)?
 - Should the focus be modified to also include mentor research strengthening?
 - Should the program be modified to more strongly encourage mentor/partner interaction?
 - Are there ways to more effectively reach the target audience for applications?
 - Should NSF partially fund many smaller proposals or fully fund a few?

The Committee intends to develop and submit a White Paper to the NSF as input to its planned Portfolio Review⁷.

In 2010, AURA participated in the development of a proposal by a group of mid-West academic institutions for a Louis Stokes Alliance for Minority Participation (LSAMP) award. This effort, called IINSPIRE (**I**owa, **I**llinois, **N**ebraska **S**TEM **P**artnership for **I**nnovation in **R**esearch and **E**ducation), would reach about 100 minority students per year, many of whom are likely to be in engineering majors. AURA will mentor up to three students per year. AURA mentors will also participate in the mentor training programs included in the IINSPIRE proposal. In 2011 it was announced that IINSPIRE received an award from the NSF. In 2012 AURA Centers will work to develop this partnership with academic institutions.

Community Engagement

AURA has continued its commitment to establish a greater presence at national meetings associated with underrepresented minorities. For 2011, AURA participation included:

- In January, 2011, Dr. Bernice Durand, Chair of the AURA Workforce Diversity Committee, and Sheryl Bruff, head of HR at STScI and STScI Diversity Advocate, presented information for an AAS special session entitled, "Addressing Harassment and Prejudice." The session was organized by Dr. Dara Norman (an NOAO Diversity Advocate) for the CSMA and CSWA joint sponsors.
- At the January meeting of the AAS Executive Council, Sheryl Bruff was invited by Dr. Pat Knezek to provide an informational presentation and discussion on workplace harassment issues and the AAS anti-harassment policy for the Council.

⁷ See <http://www.aura-astronomy.org/news/news.asp?newsID=262>

- In Sept 2011, AURA co-sponsored an Astronomy Networking Event of students and faculty at the Joint Annual Meeting of the NSBP and NSHP in Austin, TX.
- Again, during the summer of 2011, STScI continued the HST Summer STEM Internship program in partnership with the Maryland Space Grant Consortium. This is a pilot internship program that provides an opportunity for an underrepresented undergraduate student to participate in STEM activities related to HST computer science applications. To date, two minority students, one male and one female, from Morgan State University and Capitol College have participated. Capitol College is a new relationship developed this year. It is a minority serving institution specializing in programs in STEM careers.
- STScI continues to develop strong ongoing partnerships with area colleges, universities and city/county organizations in an effort to generate a pipeline of interns, particularly in science, engineering and outreach. Ongoing relationships have been cultivated with University of Maryland, Baltimore County (UMBC), Capitol College, Morgan State University, ITT Technical Institute, the Mayor of Baltimore's YouthWorks Program, and My Sister's Circle. Of the 16 additional interns who worked or are working at STScI in 2011, 7 were female and 7 were from underrepresented minorities. One of our current interns (African-American female) started with STScI as a high school intern working with one of our scientists, returned as a summer student in 2011 and has remained working on a science project with our HST Mission Office Project Scientist.
- NSO participated in the Austin joint NSBP/NSHP meeting in September 2011 and in the SACNAS national conference in San Jose, CA in October 2011.

I thank all of the AURA personnel who have contributed to these activities. I especially thank AURA's Diversity Advocates.

A handwritten signature in black ink that reads "William S. Smith". The signature is written in a cursive style with a large, stylized initial "W".

Dr. William S. Smith
President
Association of Universities for Research in Astronomy

Association of Universities for Research in Astronomy

**Comment Submitted to the NSF
Concerning Proposed Revisions in Merit Review Criteria
June 30, 2011**

I am commenting on behalf of the Association of Universities for Research in Astronomy (AURA), a not-for-profit consortium of 37 US academic research institutions committed to advancement of the astronomical sciences. AURA operates cutting edge observing facilities on behalf of the NSF and NASA.

AURA deeply appreciates the efforts of the National Science Board and the NSF to revisit its policy for merit review. The principles of intellectual merit and broader impact are now deeply ingrained in the science community and have become a major reference point since they were first introduced.

In particular, it has been widely recognized that participation by women and underrepresented groups in STEM fields has been lagging and must be directly addressed in order to develop the full potential of the US workforce. In the field of astronomy and astrophysics, the recent Decadal Survey Report entitled *New Worlds New Horizons* observed that “...*Little progress has been made in increasing the number of minorities in astronomy. Agencies, astronomy departments, and the community as a whole need to refocus their efforts on attracting members of underrepresented minorities to the field...*” The report concludes “...*For many reasons, improving the involvement of minority Americans and women is a matter of the **highest priority.***”

The NSF criteria for merit review has, in the past, directly addressed this critical need and have provided specific guidance to proposers. The NSF strategic plan states a clear commitment to ensuring that the rich diversity of the nation’s cultures is well represented in the STEM workforce.

The America COMPETES Act has mandated eight specific goals for broader impacts. These are roughly reflected in the principles articulated in the June 14 request for comment. One of these, “*Increased participation of women and underrepresented minorities in STEM*” retains the focus on broadening participation and appropriately sets this as a national goal.

However, the accompanying five guidelines fail to provide the specificity and clarity that the NSF has used in the past. The new guidelines relate to the quality and completeness of the proposal itself rather than the substance of what is being proposed. Moreover, the proposed guidelines may operate to lessen the scientific community's engagement with the serious issue of workforce diversity. While the Congressional mandate addresses increased participation of women, minorities in STEM fields, the implementing guidelines do not relate this to workforce development.

The former guidelines suggested substantive guidelines for proposers more clearly. AURA recommends that in implementing the new merit review criteria, guidelines be included that specifically address the following:

- Affecting future workforce demographics in the areas of gender, ethnicity, disability, and geographic representation.
- Mentoring responsibilities of individuals and research organizations.

AURA appreciates the opportunity to comment on this important policy matter and we look forward to participating in making the NSF mission a success.