Women in Astronomy and Space Science: The Concerns of Early Career Women Scientists

Presented to

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Foreword

As part of the Conference on "Women in Astronomy and Space Sciences" held October 21-23, 2009 in College Park, MD, a group of conference participants were invited to attend a tour of the White House and have the opportunity to meet with Tina Tchen, the Director of the While House Office of Public Engagement and Executive Director of the White House Council on Women and Girls, and Sarah Stewart Johnson, White House Fellow at the Office of Science and Technology Policy. Those of us who were early career scientists (graduate students or postdocs) met over lunch prior to the White House tour to discuss what our biggest concerns were and how the White House could help us address those concerns. We formulated our statements and read them to Ms. Tchen and Dr. Stewart Johnson at our meeting. This paper is the presentation we gave.

1. Introduction

As early-career women in astronomy, our group was able to identify six major themes that concern us. The first is the long career path to becoming a professional astronomer, which requires perhaps 5-7 years of graduate school, plus a similar length of time as a postdoctoral researcher ("postdoc"). During this time, encompassing our twenties to early thirties, we are seldom considered full-time employees of our institutions, despite the fact that we are working full time.

This leads into the next two issues that concern us: health care and parental leave policies. Our concerns about health care include domestic partner benefits, dependent care, and coverage in the event of pregnancy. Parental leave policies are of concern because graduate students and postdocs are often not considered to be employees, but fellows with stipends; therefore we are not covered by the Family and Medical Leave Act (FMLA). Child care is also an issue that affects many of us. In both health care and parental leave, the U.S. falls far short of the coverage that exists in virtually all other industrialized nations. The resolution of these issues can directly benefit us as women in astronomy.

A fourth issue is that women still face bias, despite existing laws meant to guard against most forms of discrimination. Women's job performances are often evaluated as inferior to that of men's, despite equal or superior accomplishments. Minority women also face additional implicit biases. The existence of implicit bias needs to be recognized and ways of fighting it must be developed.

The last two issues deal with education and public outreach (E/PO), and mentoring. E/PO is important for keeping children interested in science starting from a young age. At every step along the scientific career pathway, from the student to the faculty level, mentoring, particularly from individuals who look similar to ourselves is important. Federal granting agencies should actively support and incentivize mentoring activities. It is also important for the work of E/PO and mentoring to be valued and rewarded within our professional circles.

2. Career Trajectories for Women in Astronomy and Space Science

There is an enormous difference between the ways young academic scientists are regarded compared to our peers who take jobs after college. Our peers are treated as professionals and have access to benefits and support structures. Meanwhile, we are working as scientific researchers as graduate students or as postdocs. Despite our considerable skills and the difficult tasks that we take on, we scientists are still treated as students.

Graduate school takes 5-6 years. Postdocs take 2-3 years each, and we typically do multiple postdocs before landing a permanent position. In other words, we spend our twenties and early thirties (prime childbearing years) frequently changing jobs and often having to move multiple times. The graduate and postdoctoral research trajectories introduce a series of unavoidable short-term transitions at a point in life when many women need stable employment and health insurance in order to support family life. Also, statistics show that many female scientists have spouses who are also in academic research, which compounds the income and childcare issue. Male scientists are currently less likely than female scientists to have a spouse in academic research, which often helps mitigate the income or childcare challenge.

- We need to make sure early-career women in science are fairly compensated and respected for their skills.
- We need to provide income and health insurance stability for early-career women in science as they navigate the graduate and postdoctoral transitions.
- We need generous family leave policies and affordable childcare to enable early-career women to maintain their jobs while growing their families.

3. Health Care

Comprehensive and affordable health insurance coverage is not always available to early-career scientists. This situation can unduly burden both graduate students and postdoctoral scholars—while postdocs are *not* students, they are also not treated as true employees by many academic institutions. Healthcare represents just one more source of worry for young

scientists who are already confronting the stress of temporary and uncertain employment during their early careers. This situation is particularly difficult for young scientists facing the healthcare costs associated with beginning (or expanding) a family. Concern over healthcare costs may also discourage young scientists from pursuing non-standard but important careers in science, including professions that focus on public outreach, teaching and/or public policy. *In order to <u>attract</u> and <u>retain</u> the next generation of scientists, particularly women, minorities and students from disadvantaged backgrounds, healthcare must be made affordable and accessible for all young scientists.*

4. Family Leave Policies

As young scientists, we have a growing concern about causes for attrition in our discipline. One of the possible reasons for the loss of young female scientists is the lack of a welldeveloped and comprehensive family leave policy across all workforce levels. Grant-supported young scientists such as graduate students and postdoctoral scientists are particularly vulnerable because they are not protected from pregnancy discrimination. The Family and Medical Leave Act (FMLA) does not apply to graduate students and postdocs and granting agencies do not have policies to support researchers who take leaves of absence for family or medical reasons. For example, a postdoctoral fellow in her 20's or 30's may become pregnant. Depending on her advisor, institution, or funding agency, she may be granted leave, but it will likely be unpaid and possibly without insurance, or she may even be asked to leave her research position. The existence of policies for graduate students, postdoctoral researchers, research scientists and faculty alike would assist the cause of science by allowing us young scientists to simultaneously pursue science and support our families. Such policies would greatly help us through the difficult and poorly timed transitions in our careers.

Our opinion, supported by recent data from The Shriver Report, is that addressing the issue of both parental leave and family care policies on the national level would greatly benefit astronomy by attracting and retaining the best scientific talent. The current administration can help affect this change by becoming a model institution as well as incentivizing programs for universities, national labs, and other scientific facilities. We also recommend that federal grant agencies (e.g. NSF, NASA) proactively implement funding policies for family and medical leave.

5. Conscious and Unconscious Bias

Conscious and unconscious biases are still prevalent in the hiring, assessment, and promotion of individuals in the scientific work force. Many studies demonstrate that stereotypes and expectations of a group influence how they will be judged. For example, in a study on evaluation of identical application packages, universities preferred to hire "Brian" two-to-one over "Karen" for professorships. Another study, involving identical resumes submitted for business jobs, showed "Brads" were called back twice as much as "Hakeems," regardless of the job. People hold these stereotypes, regardless of which group they themselves belong to, and they are not necessarily aware of these biases. One instance of this may seem small, but summed together amounts to a substantial and self-sustaining disparity.

Fortunately, several practices have been shown to help alleviate this problem:

- Awareness: Knowing that there is a problem is the first step; let people know they are unconsciously overlooking talent.
- Practices, especially pertaining to job candidate evaluation and recruitment: Increased documentation and knowledge of individuals *decreases* use of stereotypes, so candidates should be evaluated based on several criteria instead of global judgments. It

also helps to increase the pool of individuals from a given group, so stereotypes are not useful in evaluation.

- Policies: Require annual reviews to assess how practices are working and require evaluating committees to be diverse.
- Accountability: Give rewards for successful practices and disincentives for maintaining the status quo.

6. Education and Public Outreach

Based on studies such as the National Research Council's January 2009 report, "Learning Science in Informal Environments: People, Places, and Pursuits", informal education and public outreach can play a major role in inspiring young girls to pursue science. However, there are a number of issues, some of which are outlined below, that reduce the effectiveness of informal education. Here we suggest some policies that the White House could advocate to address these issues:

1) Many parents do not or cannot make informal science education a priority for their young girls due to misinformation, antiquated perceptions, and/or limited resources.

Action: Launch an education campaign similar to the Harlem Children's Zone that empowers parents to empower their children and impresses upon them the value of a scientific education for both genders.

2) Not all families can access or afford to attend science museums and/or informal science education programs.

Action: Subsidize science museum construction and admission, especially in inner city areas, or give tax breaks to the organizations that do. Stipulate that a portion of these exhibits/educational programs explain the science done by women in a wide range of scientific disciplines so that the young girls who attend these programs can find a variety of role models who "look like them" and do science.

3) Many girls learn through social cues that science is "for boys". This realization, reinforced by authority figures, peers, and the media, can conflict with their developing gendered self-perception and lead to decreased interest in science.

Action: Enforce schools' continual assessment of their Title IX compliance with respect to science education and reward those schools that exhibit equal male-female enrollment in science courses.

4) There is a disconnect between the enthusiasm for science discovery inspired by informal education outside the classroom and the "boring" view of science received inside the classroom.

Action: Include inquiry-based science skills on equal footing with reading, writing, and math skills in the "No Child Left Behind" exams. The inclusion of discovery-based science on national standardized tests will incentivize teachers to spend more time on science labs where students get hands-on experience in science.

We also wish to bring to the White House's attention an issue that has arisen in informal education and public outreach which directly affects us as early-career scientists: **due to the high demand for female role models, many professional women scientists are expected to do more outreach than their male counterparts. Unfortunately, this time commitment interferes with their research productivity and puts them at a disadvantage in their scientific field compared to their male colleagues.** This issue motivates the evaluation of existing informal educational programs and how efficiently they use the time volunteered by female scientists. Nevertheless, we encourage the White House to continue to hold pro-science events that have diverse scientists in attendance, such as the recent star party on the South Lawn. The high publicity of these events can slowly but noticeably change the public

perception of the white male scientist as "typical."

7. Mentoring

When we talk about changing the face of astronomy or physics, it is crucial that we talk about mentoring. This is true for all future astronomers and physicists, and studies show that it is particularly important for white women and all scholars from underrepresented minority groups. Hands-on and one-on-one mentoring brought all of us to our current scientific positions, and multiple studies indicate that mentoring is crucial for our career development. Enhancing mentoring is a straightforward way to enhance diversity.

Luckily, we have a wealth of homegrown intelligence about how to successfully mentor and support diversity. Minority-serving institutions (MSIs), particularly Historically Black Colleges and Universities (HBCUs), are great successes! The top eight producers of Black PhDs in STEM careers, for example, are all HBCUs. Therefore:

- We must continue to help HBCUs and other MSIs do the work they do so well by helping to ensure that their science programs continue to grow.
- We must learn how to do adapt their practices and bring them into the majority institution setting. This effort can be enhanced by the development of Bridge programs, like the Fisk-Vanderbilt partnership, Columbia University Bridge to PhD program, and one currently in development at MIT Physics.

8. Conclusion

The concerns of early career women astronomers are not necessarily much different from average Americans. As I am writing this, landmark health care legislation is finally being signed into law. Family-friendly policies are highlighted in the Shriver Report ("A Woman's Nation Changes Everything") as being crucial to working families across the country. The Obama administration has launched the "Educate to Innovate" campaign to encourage more students to study STEM fields. The National Science Foundation (NSF) has recognized the importance of mentoring by now requiring postdoc mentoring plans on all grant proposals. These are all steps in the right direction, and the effort to implement them all in full must be continued and sustained. Moreover, these initiatives do not necessarily address the underlying problem of the length of the postdoctoral period, nor do they directly address the problem of unconscious bias. Still, our discussions with Ms. Tchen and Dr. Stewart Johnson gave us great hope for the future.