# Advancing the Engagement and Success of Women in Astronomy
# Preliminary Status Report

(PI: Shardha Jogee, May 20, 2019)

## I. Recapitulation of Broad Proposal Goals

The 2018-19 Heising-Simons Foundation (HSF) Physics and Astronomy Leadership Council (PALC) grant is supporting a new set of initiatives launched by the UT Association of Women in Astronomy Research and Education (AWARE; https://astronomy.utexas.edu/about/department-resources/aware), which was created in 2014 by Dr. Shardha Jogee. AWARE aims to increase the participation and success of women and other under-represented groups in Astronomy and the general STEM (Science, Technology, Engineering, and Mathematics) fields through three sets of strategic initiatives:

1) **Vertical mentorship, support, and professional development of women in Astronomy**: AWARE brings together women in the UT Astronomy Department at different career levels (including undergraduate and graduate students, postdocs, faculty, research staff, and outreach staff) to provide a vertical mentorship and support system. We aim to provide a supportive and empowering environment that validates shared experiences. We organize activities tied to professional development, communication, student awards, career advancement, networking, and work-life balance.

2) **Education and engagement of the broader community on equity and inclusion**: Through externally directed activities, we aim to educate the broader community (department, college, society at large, etc) on the importance of an inclusive environment where everyone in society has access to STEM opportunities. Activities include discussions, lectures, and panels on science and equity n the Astronomy Department, the College of Natural Sciences (CNS), and the University campus. We increase awareness of explicit and implicit gender bias, and we foster best practices in the work environment and in the admission, hiring, tenure, and promotion process.

3) **Building the STEM pipeline**: The 2012 report from the President's Council of Advisors on Science and Technology (PCAST 2012) indicates that our nation needs to produce one million additional STEM graduates over the next decade than expected under current assumptions. Growing our nation's STEM force requires us to engage *the full pool of excellence in our diverse population*. Yet, numerous studies (e.g., the 2010 AAUW Report “Why So Few?”) report that women and girls are under-represented at all stages (K5 to PhD of the STEM pipeline. AWARE aims to strengthen this pipeline through numerous outreach activities that engage girls from K5 to PhD in STEM activities.

## II. Initiatives to Advance the Success of Women in Astronomy funded by the Heising-Simons Foundation PALC Grant

We provide below a brief report on some of the initiatives supported by the Heising-Simons Foundation PALC grant.

### A1) AWARE Graduate-Undergraduate Mentoring Program

**Activity Lead: Andreia Carrillo (UT Astronomy Graduate Student) and UG student reps.**

**Fig. 1 – Top:** UT Astronomy undergraduate (UG) students participating in the AWARE Graduate-UG mentoring program funded by the HSF PALC grant. **Bottom:** Panel of graduate students answering questions from the UG mentees.

Having a great support system and mentors is regarded as one of the most important factors in retaining women and underrepresented minorities in STEM. On January 31, 2019, we had the AWARE Graduate-Undergraduate Mentoring Program kick-off meeting (funded by the Heising-Simons Foundation PALC grant to AWARE). It was attended by 15 astronomy graduate students and 30 undergraduate students (Fig.1).

The UT Astronomy Department is one of the largest in the country and for an aspiring astronomer, it is easy to be overwhelmed and intimidated by the size of the department or by the breadth of ongoing research. To alleviate this, each undergraduate is paired with a graduate student mentor based on their common interests and what they want to get out of the mentorship, and the pair then meets regularly. The idea is that this mentorship is "for life" and extends beyond the semester or the year, and that they have this connection and mentorship as both the mentor and the mentee progress in their Astronomy careers. This is especially important to have for women and underrepresented minority who face macro and microaggressions, discrimination, and other barriers that can easily discourage them from pursuing Astronomy.

## A2) AWARE Graduate Student-Postdoc Support & Mentoring Meetings

**Activity Leads: Sydney Sherman and Raquel Martinez (UT Astronomy graduate students)**

**"Astro Ladies Nights"**

**Fig. 2 –** AWARE Graduate Student-Postdoc support and mentoring meeting funded by the HSF PALC

In the past year, a group of female graduate students and postdocs have been holding "ladies' nights" approximately once a month. AWARE funds from the Heising-Simons

Foundation PALC grants support food and logistical items. During these meetings, attendees gather at an apartment, discuss their experiences, and build community among the female graduate students and postdocs (Fig.2). Example topics include

- Vertical mentorship among postdocs, senior graduate students, and junior graduate students. Topics discussed include everything from balancing coursework and research in the first two years, to the nuances of the qualifying exam, and tips for applying for postdoctoral positions.
- Best practices for writing papers, attending conferences, and meeting the expectations of advisors and committee members.
- Challenges of being a woman in a male-dominated field, discussing how members of this group have overcome these challenges, and exploring ways to improve the experience of women in Astronomy.

**Astro Ladies' Coffee:**

**Fig. 3 –** AWARE Graduate Student-Postdoc support and mentoring meeting funded by the HSF PALC grant.

The female graduate students of astronomy have been informally meeting together over coffee a few times each semester to check-in with each other. AWARE funds from the Heising-Simons Foundation PALC grant allowed them to purchase coffee and pastries for these informal meetings (Fig. 3). During these meetings, the group checks to see if anyone needs help or support on an issue (everything from general graduate school advice to helping junior graduate students decide which courses to take). This allows for very informal check-ins and peer or vertical mentorship among the female graduate students. Sometimes, female postdocs or visiting female astronomers of interest are invited too. Both internally and with visiting female astronomers, the group discusses career paths, current events pertaining to women in STEM, and department climate.

**Attendees to both events include:**

| Graduate Students: | | Postdocs: |
|---|---|---|
| Briana Indahl (5th Year) | Jackie Champagne (3rd Year) | Micaela Bagley |
| Raquel Martinez (5th Year) | Rebecca Larson (3rd Year) | Anna Schauer |
| Rebecca Tippens (5th Year) | Caprice Phillips (3rd Year) | |
| Jessica Luna (4th Year) | Patty Cho (1st Year) | |
| Sinclaire Manning (4th Year) | Maddie Lucey (1st Year) | |
| Sydney Sherman (4th Year) | Kendall Sullivan (1st Year) | |
| Andreia Carrillo (3rd Year) | | |

## A3) Girl Day 2019: Building the K-12 STEM pipeline

**Activity Leads: Andreia Carrillo and Briana Indahl (UT Astronomy graduate students)**

Girl Day STEM Festival is a yearly outreach event organized by the Women in Engineering Program and it is attended by ~10,000 elementary and middle school students. It is the biggest outreach event at UT aimed at making the Sciences, Math, and Engineering, fun and exciting for students by having hands-on activities and demonstrations.

On February 23, 2019, AWARE and general department members ranging from undergraduate students to faculty members set-up demos and activities (Fig. 4) that aim to engage and inspire students to consider a career in STEM. The demos included star charts, make-your-own mini pulsars, UV beads to demonstrate the effects of UV from the sun, and solar viewing, to name a few. The AWARE funds from the Heising-Simons Foundation PALC grant supported the purchase of materials for demos and activities, as well as refreshments for the volunteers.

Aside from benefiting the young girls who attended, the AWARE involvement for Girl Day is also a departmental activity that encompasses participation from people at different levels of their Astronomy careers and fosters an inclusive and dynamic community working towards one goal: to increase and encourage women in STEM.


**Fig. 4 –** AWARE hosting mentoring activities supported by the HSF PALC grant for Girl Day, which brings 10,000 elementary and middle school students to the UT campus annually to inspire them to consider a career in STEM.

## A4) Advancing a Climate of Inclusion in the RLM (PMA) Building

**Activity Leads: Shardha Jogee (Professor and Department Chair) and the College of Natural Sciences Dean's office and communication team.**

The Physics, Math, and Astronomy (PMA) departments on the UT Austin campus are housed in the Robert Lee Moore (RLM) building, which has a long history of lacking diversity in gender, race, and ethnicity. Current students in RLM (PMA) have indicated that this lack of diversity is having a lasting negative impact on them, and on generations of aspiring young scientists from marginalized backgrounds who already struggle with institutional barriers to equity.

We are using the AWARE Heising-Simons Foundation PALC grant to help foster a climate of Inclusion in RLM (PMA) building. We plan to imprint RLM (PMA) with diverse perspectives by installing flat screens, which will feature scientific news *du jour*, interspersed with slides depicting the photo and biographical achievements of renowned scientists from under-represented groups (e.g., female, black, African American, Hispanic).

This idea was proposed to the UT Astronomy Department in Spring 2019 and received strong and enthusiastic support. We are currently in the process of ordering 48" flat screens, which will be installed in strategic locations on the four Astronomy floors (13$^{th}$ to 17$^{th}$) in the RLM (PMA) building. We anticipate installation to be completed in Fall 2019. Featured scientists will include UT Austin PMA scientists, such as **Antoinette de Vaucouleurs, Beatrice Tinsley, Cecile DeWitt, Karen Uhlenbeck** (winner of the 2019 Abel Prize**)**, and others. The UT College of Natural Sciences (CNS) communication team is assisting us with the development of the biographical slides.

While the initial HSF-funded pilot project will only target the four Astronomy floors, we hope that CNS will fund and extend this initiative to the Math and Physics floors in the PMA building.

## A6) Professional workshop on *"The Imposter Syndrome"* - TO BE DONE

Fighting implicit bias and the imposter syndrome, and establishing a growth mindset are important steps toward advancing the retention, success, and morale of women and first-generation college students (e.g., Valian 1999; AAUW report 2010; Pollack 2013; Yeager et al. 2013, 2016). In fact, female researchers in our department who attended an AAS workshop in 2013 on fighting the imposter syndrome reported that it was one of the most liberating and empowering experiences in their career.

## A7) Leadership training for rising female leaders TO BE DONE

*Change follows power*. Advances in gender equity and institutional changes often happen faster when the highest levels of University leadership (Department Chairs,

Associate Deans, Deans, Provost, and President) include female leaders and allies committed to equity and inclusion. We are exploring how to provide different elements of leadership training (e.g., effective communication and advocacy, negotiation skills, development of strategic visioning external relations, fundraising, network of senior leaders) for rising female leaders.