Statement of teaching and mentoring experience with fostering inclusion, diversity, and equity

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I am excited about the teaching and mentoring opportunities at the Department of Astronomy and Astrophysics at the Pennsylvania State University (PSU). I have an extensive mentoring experience with several of my students who have successfully written first-author publications in peer-reviewed journals and presented their work at various conferences. Many of these students have successfully advanced their careers based on the work experience they have gained with me; this includes getting into graduate schools and landing lucrative jobs in industries.

Mentoring and teaching experience with demonstrated efforts to foster inclusion, equity, and diversity

Over the years, I have worked with around two dozen students at various levels (7 graduate students and 17 undergraduate students). I am well aware of the different degree of social, cultural, and educational barriers many students may face when they move to a research field. I have worked with students at all levels across many countries (USA, India, China, Ireland, and Italy) and I tend to adapt to their learning style. I strongly believe that an inclusive and diverse environment within any research group fosters a positive feedback loop where new ideas are generated, developed, and refined. I am proud to state that six of my undergraduate students, all from diverse cultural, gender, and socio-economic groups, have advanced to graduate schools or have secured jobs in industries based on the research experiences they have gained while working with me. Most of my primary research works with students can be broken into two main subjects; (a) designing novel signal search algorithms to search for evidence of advanced extraterrestrial intelligence (or ETI) and (b) searching and studying Fast Radio Bursts (FRB). Both of these topics are cutting-edge and have a huge potential to carryout a number of projects to make significant headways.

I come from a small town in India where I had very limited exposure outside the school curriculum including close to none internet access. Coming from an underprivileged background myself, I am well aware of challenges faced by members of minority groups. Hence, I am committed to these core values of maintaining diversity, inclusion, and equality in academic and personal conduct. For example, Ketan Sand, an undergraduate at the Delhi University in India, wrote to me about his ambition for a career in astronomy and asked for my guidance. We worked together for two years, fully remotely, while he was an undergraduate in India. He was able to gain sufficient background on the nature of FRBs. Together, we lead the first discovery of FRB at lower radio frequencies with the Giant Meterwave Radio Telescope in India, a paper on which

we just recently submitted with him being the first-author. With this experience, he was able to enroll into a prestigious PhD program at the McGill University, Canada to continue his work on FRBs with the CHIME telescope. Two of my other students, Dominic LeDuc and Gerry Zhang, worked with me to design fully supervised Convolutional Neural Network-based classifiers to identify FRBs or other broadband transients from ETI. This experience provided them the necessary image processing background which helped them get lucrative jobs in industries. One other undergraduate, Casey Brinkman-Traverse, from University of Vermont (UVM), worked with me on developing pipelines to scrutinize polarization data products from Robert C. Byrd Green Bank Telescope in the USA. When we detected the highest degree of Rotation Measure from an FRB, her pipeline helped us trust our results and she joined us as one of the co-authors on a paper which we published in Nature and got Casey highlighted in her UVM newsletters.

I am also very proud to be mentoring my current graduate and undergraduate students. Karen Perez worked with me, as an NSF REU undergraduate, on developing a pipeline to detect pulsars at the Galactic Center, when she was undergraduate at Cornell University. She is currently a PhD candidate at Columbia University and is currently my collaborator and works on a number of pulsars and technosignature projects. I have also mentored several undergraduate and graduate students from China, UK, Iran, and Ireland. I am well aware of different pedagogy backgrounds and I have subsequently adapted my interaction to meet their needs and comfort level.

Teaching and mentoring philosophy committed to follow at PSU

I also enjoy teaching, as it motivates one to think deeper about the subject matter and ask critical questions to describe complex ideas with simplified condensed representations. During my doctoral training, I have served as a teaching assistant for various graduate school courses, including courses on ‘Statistical techniques in data analysis’ and ‘Stellar Astrophysics’. I have given numerous seminars in summer and winter schools to undergraduates and taught several hands-on tutorials on radio telescopes and pulsar data analysis. I am sufficiently experienced in observational astronomy techniques and would love an opportunity to deliver high-quality seminars to undergraduates and graduate students at PSU. I will also be able to design and teach the undergraduate and graduate courses or seminars on other advanced areas of theoretical astrophysics; such as ‘Transient Universe’ and ‘Emission mechanism’. With my newly acquired expertise, I am particularly keen to introduce a course on ‘Machine Learning in Astronomy’.

I strongly believe that an inclusive and respectful environment inside the classrooms and research group is necessary to make members of minority gender, social, or economic groups feel welcome. As an advisor and a teacher at the PSU with a diverse international student body, I will be mindful of the problems faced by students from different socioeconomic, cultural, gender and linguistic backgrounds and will support the efforts from department and university to increase the participation of underrepresented groups in science. Such initiatives are important to bust biases and also provide role models for the future generations. Following my principles of equity, I will organize special tutorials and office hours for students who may need additional help to build up their background and catch up with their peers.

Some of the key principles I am committed to focus when teaching and mentoring students at PSU are as follows.

- Pedagogy that strives to serve the needs of all students, regardless of background (e.g. race, class, socio-economic status, gender, sexual orientation, country of origin, ability, as well as cultural, political, religious, and other affiliations) and engage with them to help them achieve excellence.
- Choosing a research project that focuses on further development of particular skills and abilities in the area of a student's own interest and career goals.
- They should acquire a clear understanding of their project's impact on a larger scale and should feel motivated.
- Allow them to think critically and creatively to find solutions at various stages of the research project. However, be mindful to not let them deviate if their approach might be time and resource consuming while a quicker solution already exists.
- Encourage them to present their works at national and international level conferences to boost their confidence.