

## Carl Edward Fields, Jr. - Personal Statement

The American Physical Society (APS) shows that  $\lesssim 3\%$  of doctorate degrees in physics from 2006-2008 were awarded to African Americans.<sup>1</sup> This startling statistic may be a direct result of socioeconomic issues that inhibit access to education in the field of physics and astronomy [2]. As an African American student who is the first to attend college from a family that faced significant socioeconomic hardships, I felt that it was my duty to excel in my undergraduate career. Learning to succeed in university coming from such a diverse background has been a process that has taught me a lot about myself and helped to further my desire to pursue physics and astronomy. Along my journey, I wish to play a strong role in scientific communication, public outreach, as well as advocating for educational equality and the advancement of equal representation amongst minorities in STEM.

My efforts towards becoming an effective science communicator began with a course on *Methods of Teaching Physics*. Through various activities such as Socratic dialoguing and the in-depth review of many technical articles on pedagogical methods and active learning techniques [e.g., 1, 3], I had become confident in my potential as an instructor. Furthermore, this course has helped me realize the educational resource that my unique experience offers.

During my undergraduate studies, I was employed as an instructional aide (IA) wherein I taught an introductory physics course to non-physics majors. Arizona State University (ASU) is a growingly diverse university with  $\sim 36\%$  of the undergraduate population consisting of minority students.<sup>2</sup> In particular, many of my students came from various ethnic and socioeconomic backgrounds. My unique background helped in my ability to understand the diverse needs of my students and led to a greater experience for everyone.

In addition to my work at the university level, I was offered a role as an instructional fellow at The Western School of Science and Technology (WSST). WSST is a public charter school whose mission is to help promote interest in science and technology in those whom come from low income families or are dealing with other socioeconomic factors. My current role at WSST is volunteer tutor, where I lead small breakout tutorials designed to foster success amongst students struggling with course material. By engaging directly with students with various socioeconomic issues that may have impeded their educational opportunities, I hope to share my experience and inspire them to pursue higher education.

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<sup>1</sup> <http://www.aps.org/programs/education/statistics/degreesbyrace.cfm>

<sup>2</sup> <https://diversity.asu.edu/bythenumbers>

Beyond my work as an instructor, I am also a participant in Sundial, a peer mentoring program at ASU. Over the past two years I have been a mentor for entering physics and astrophysics students. My role as a mentor has ranged from helping the students with coursework, offering advice on studying strategies and how to plan for success as a physics major at ASU. I am actively mentoring astrophysics freshman Tyler Cox by assisting him in developing programming skills to become a participant in scientific research at ASU.

Advancement in science education is also a large part of my goals. With the help of my advisor, I have created an educational tool called, MESA-Web<sup>3</sup>, a web based interface to the stellar evolution code, Modules for Experiments in Stellar Astrophysics. This project seeks to make it easier to teach astronomy at all levels by allowing users to evolve a stellar model with only an internet connection. Since its inception in June 2015 over 100 users worldwide have benefitted from this effort. My current role is to continue to extend its capabilities to allow for even further utilization amongst instructors around the world.

My service in different societies and organizations has provided me with the platform upon which I can engage with the public. I am a member of the Society of Physics Students, Astrodevils at ASU, a member and student representative of the National Society of Black Physicists, an elected associate member of  $\Sigma\Xi$  (Sigma Xi) national honor society, undergraduate member of the APS and elected junior member of the American Astronomical Society. I have also participated in a multitude of activities focused on interacting with the public such as interviews and video presentations, including a lecture for ASU's EdX *Introduction to Solar Systems Astronomy* course, the largest college-credit astronomy course in the world.<sup>4</sup>

My sustained involvement with the community, unique background, and continued efforts towards becoming an effective scientific communicator will be an invaluable asset in my development as an instructor. I feel it is paramount that students of diverse backgrounds are exposed to scientific research and have an equal opportunity to pursue higher education.

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[1] Meltzer, D. E. 2012, *American Journal of Physics*, 80, 478

[2] Norman, D. 2009, in *Astronomy*, Vol. 2010, The Astronomy and Astrophysics Decadal Survey

[3] Swackhamer, M. W. D. H. G. 1995, *American Journal of Physics*, 63, 606

<sup>3</sup> <http://mesa-web.asu.edu>

<sup>4</sup> <https://www.edx.org/course/introduction-solar-systems-astronomy-asux-ast111x>