CfA REU Application Essay

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I have loved astronomy since I could read a book. It has always fueled my imagination more than anything else. When I was in high school however, I was also enamored with the idea of flying, particularly for the US Navy. When I went to college in the early 2000's, I whole-heartedly pursued that end through Navy ROTC and a degree in chemistry. While I didn't end up as a pilot, I did serve as a US Navy officer for 5 years following college, specializing in nuclear reactor operations. When I left the Navy, I decided I wanted to share my love for science by pursuing a career getting others excited about science – as a middle school science teacher. For 6 years, I told my students all about physics and astronomy, and even created an elective class about space exploration. Getting kids excited about space reminded me of something I had forgotten – just how thrilling it is to learn about space.

So, I left teaching and decided to pursue a career that will let me do just that. 3 years ago, I returned to college to pursue a second bachelor's degree in astronomy and physics. This time through, I am finding that I am much more focused, much more driven, and am pursuing astronomy research with a fervor. For 2 semesters, I worked in the VIRUS instrumentation lab building the largest fiber-fed spectrograph for the HETDEX project. In summer 2016, I participated in an REU at Norther Arizona University, where I conducted an astrophysical lab project exploring the stability of liquid mixtures in the Titan environment, and how the lakes on Titan might interact with that environment. In Jan 2017, I began a research project with Dr. Adam Kraus on determining the allowed orbital parameters for several directly-imaged wide exoplanet systems based on observation.

Without a doubt, my work with Dr. Kraus has had a significant impact on my career goals. My earlier research experiences taught me that I love research; this project taught me that I *really* love exoplanet research. This project has significantly challenged me. I have studied in depth the physics of Keplerian orbits. I have developed two statistical modeling tools for my analysis – a custom-built Metropolis-Hastings MCMC for high precision astrometry and a rejection sampling algorithm for fitting orbital parameters (modeled after Orbits for the Impatient by Blunt et. al. 2017). I have presented my work as numerous astronomy conferences and undergraduate research seminars. I have traveled to the W. M. Keck Observatory to collect data for my analysis. My programming and presentation skills continue to grow. I am currently writing up my results and intend to submit to a journal in early 2018. I am very proud of the work I have achieved so far in astronomy research, and I am ready to continue to push my skills, experiences, and involvement.

Outside of the classroom and computer lab, I am involved in several activities both on and off campus. I am an active member of the Astronomy Student's Association, which conducts weekly meetings on astronomy topics, as well as outreach to the local on- and off-campus community. I serve as one of the Department of Astronomy Undergraduate Representatives, a liaison between the faculty and the undergraduate student population. In this capacity, I have

participated in the faculty hiring process, run several town-hall meetings and scholarship application workshops, and was one of the authors of the undergraduate white paper contribution to the department external review conducted last year. I create graphics for the Astronomy On Tap ATX show each month and set up the venue. I am an active member of the Student Veteran's Association, and am currently serving as a peer mentor, helping new veteran students transition to life as a college student. I also serve as a deacon in my church, and am big fan of backpacking and America's national parks.

Following my time at UT, I plan to attend graduate school in astronomy, with a focus on exoplanets. I very much enjoy working with directly imaged exoplanets, but I am looking to explore other areas of the field as well. Following graduate school I am less clear, but I know I want a path that lets me continue to do exoplanet science.

The exoplanet science currently being conducted at the Center for Astrophysics is extremely exciting, and would allow me to branch out and pursue new and different areas of the exoplanet field. Specifically, the work on the MEarth project and the MINERVA instrument I find particularly interesting. Also, I would be thrilled to work on projects related to transition disks or star formation, as these would give me a different and more well-rounded experience in the leading edge of planetary systems research.

I bring a unique set of skills and past experiences which have allowed me to excel at UT. The reputation of the CfA for excellence in research and inclusion leads me to believe I would be an asset to your program, and your program would be a critical and life-changing part of my pursuit of a research career.
Thank you for your time and consideration. My resume and research work can be found at www.loganpearcescience.com