Samuel A. Foreman

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CURRENT INTERESTS

I am currently seeking a position in applied physics research, particularly in hardware-software interfacing, physical modeling, and/or data analysis. My current research focuses on hardware development, namely FPGA (Verilog/HDL) programming, and telemetry development for a satellite to be launched by NASA in 2019. Moreover, I also have significant experience in quantum theory, the dynamics of non-linear/complex systems, and a wide variety of modern experimental methods including but not limited to nanoscale electronics, integrated nanocircuits, nanolithography, and various AMO techniques.

EDUCATION

University of Illinois Urbana-Champaign
Bachelor of Science, Engineering Physics, May 2015
University of Illinois Urbana-Champaign
Bachelor of Science, Applied Mathematics, May 2015
University of Iowa
PhD. Student, Physics

RELEVANT EXPERIENCE

Research Assistant — Department of Physics & Astronomy, University of Iowa — Spring 2016 - Present

Software and hardware development for HaloSat, with the goal of understanding the missing baryon problem. I've been responsible for developing the telemetry system for data transmission between the satellite and ground communications networks. In addition, I've worked on developing the operating system responsible for creating a peak detector circuit that is capable of interfacing with the various detectors in order to effectively discretize received signals. Further, I've developed optimization algorithms that work to maximize the incoming X-ray signals, while simultaneously minimizing background noise while our satellite is in operation. All research has been under the supervision and guidance of Professor Philip Kaaret.

Research Assistant — Center for Complex Systems Research, University of Illinois — Spring 2011 - Fall 2015

Modeling chaotic and Complex systems, both theoretically and experimentally using MATLAB, Python, and C/C++. I briefly investigated the existence of negative dimensional fractals by studying the propagation of heat in randomly distributed systems, in order to better understand the dynamics of nearest-neighbor dissipation. Following this, I worked on developing the theoretical framework behind Fowler-Nordheim emission in nanoscale capacitors. Using the predictions of this model, our team was successful in developing a digital quantum battery that effectively suppresses the Coulomb-Blockade, and which is able to retain energy densities that are orders of magnitude greater than current lighium-ion technologies. This research has been submitted as a patent with the United States Patent and Trademark Office, and has been submitted to the Journal of Vacuum Science & Technology B. All research has been under the supervision and guidance of Professor Alfred Hübler.

ADDITIONAL SKILLS

Extensive knowledge of the Linux kernel, Python, shell scripting, C/C++, and Matlab.
Familiarity with Verilog/FPGA programming, as well as SPI interfacing between microcontrollers.
Moderate programming skills in Javascript, Ruby, XSPEC, and ROOT.