Dana Zimmer

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About me

Dedicated and persistent researcher pursuing a doctorate degree. Possesses creativity, craftsmanship, and tenacity in the face of barriers.

Skills

Laboratory/Technical

- PCB Design (Multisim/Ultiboard, KiCad)
- Electronics (including cryogenic and RF)
- Soldering (complex superconducting joints, PCBs)
- CAD Design (Inventor, Solidworks)
- Machining (lathe, mill, drill press, band saw)
- Cryogens (helium and nitrogen)
- Ultra-high vacuum systems (assembling, baking, pumping)
- Optics (class 4 lasers, alignment of optical paths, spectroscopy)
- 3D printing
- Scientific writing in LaTeX
- Detailed record keeping and data aquisition
- Delicate work involving wiring and complex assembly

Programming

- *Languages*: LabVIEW (Certified Associate Developer), Python, C++, ROOT, Arduino, Mathematica, MatLab, UNIX
- Statistical analysis in LabVIEW, Python, and ROOT
- Image analysis in Python with OpenCV
- SPI communication with Arduino
- GitHub
- Machine Learning in Python with Keras

Professional Associations

American Physical Society
Society of Physics Students

Interests

Fusion, plasma physics, antimatter, electric propulsion, plasma thrusters, diagnostic & control systems, astrophysics, astronomy instrumentation.

Research

2019 — National Ignition Facility — Lawrence Livermore National Laboratory
Analysis of neutron spectroscopy data in collisionless shock laboratory astrophysics experiments. Fitting routine used to calculate neutron yield, apparent ion temperature, and neutron velocity.

2019 — Department of Energy SULI Internship — Brookhaven National Laboratory
Interferometry for 21 cm hydrogen intensity mapping. R&D for Stage I telescope. Correlated signals from radio galaxy Cygnus A modeled and data analyzed for precise determination of beam parameters.

2017-2018 — Antihydrogen Laser Physics Apparatus (ALPHA) — CERN
Record antihydrogen production via the merging of ultra-cold antiproton and positron plasmas in a Penning-Malmberg trap. Observation of the Lyman-alpha transition in antiatoms. Assembly of superconducting magnet power and diagnostic systems. Assembly and maintenance of cryogen cooled, ultra-high vacuum systems. Employment of silicon photomultiplier (SiPM) temperature diagnostic and characterization of added focussing optics. Study of methods for real-time feedback control of microwave radiation on antihydrogen.

2017-2018 — Cold Electron Research (CERES) — University of California, Berkeley
Cavity cooling of electron plasma within a Penning-Malmberg trap. Employment of electron cyclotron resonance from microwave radiation for B-field measurement. Design of electronic triggering system to evade cryocooler microphonic noise in measurements. Development of temperature diagnostic utilizing a SiPM to detect the light emitted by electrons directed onto a microchannel plate and phosphor screen assembly, achieving single photo-electron resolution.

Education

2019-present — Engineering Physics Ph.D. Candidate — University of California, San Diego
Gas Discharge Plasma Physics, Fluid Mechanics, Linear Algebra and Numerical Methods for Simulation, Optimization, and Control.

2016-2018 — B.A. Physics — University of California, Berkeley
Instrumentation Lab, Experimentation Lab, Particle Physics, Relativistic Astrophysics/Cosmology, Quantum Mechanics (I & II), Analytical Mechanics, Electromagnetism, Statistical and Thermal Physics, Mathematical Physics, Machine Shop, Data Science.

2016 — Physics Major — College of the Redwoods
Differential Equations.

2013-2015 — Physics Major — Humboldt State University
General Physics (I, II & III), Calculus (I, II & III), Linear Algebra, Computer Science Foundations (I & II, C++), General Chemistry (I & II).

Teaching

2015 — Freelance Tutor — Humboldt State University
Managed weekly meetings with more than twenty students, mentoring and instruction in Physics, Calculus, and Linear Algebra.

2014-2015 — Mathematics Tutor — Humboldt State University
Walk-in tutoring center dedicated to supporting students and fostering confidence in Geometry, Algebra, Calculus, and Linear Algebra.

Publications

(in progress) E. Hunter, J. Fajans, A. Povilus, C. Sierra, D. Zimmer, *Electron Counting and Plasma Temperature Measurement with a Silicon Photomultiplier.*