

Gerard E. Lawler

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Summary

Graduate student in physics specializing in the development of novel techniques for increasing electron photoinjector brightness particularly for reducing the size of free electron lasers (FELs). I have additional interest in light-matter interaction and radio-frequency engineering, especially in the context of micron to nanometer scale structures and their effects on field emission of electrons.

Skills

Programming	Python, C/C++, JAVA, Fortran, IDL, Matlab, Mathematica, LaTeX
Software	HFSS, CST, SolidWorks, Lumerical, IDL, ROOT, Matlab, Mathematica, LabVIEW
Operating Systems	Linux (Ubuntu, CentOS, Debian), Windows
Nanofabrication	Photomask layout and write, spin coating, photolithography, sputtering, plasma-enhanced chemical vapor deposition
Electronics	Microcontrollers, signal processing, robotics, fast electronics

Education

University of California, Los Angeles

PHD IN PHYSICS (ONGOING)

Los Angeles, CA

Sept. 2016 - Present

University of California, Los Angeles

MASTERS IN PHYSICS

Los Angeles, CA

Sept. 2016 - Sept. 2017

Boston University

BACHELORS IN PHYSICS, CUM LAUDE WITH DEPARTMENTAL HONORS

Boston, MA

Sept. 2012 - May 2016

- Senior Thesis: Low Cost Penning Trap design for AEgIS Collaboration

Work Experience

RESEARCH

Particle Beam Physics Laboratory (PBPL), UCLA

GRADUATE STUDENT RESEARCHER

Los Angeles, CA

Aug. 2016 - Present

- Cryogenic hardware design for RF cavity accelerator
- Laser optics and vacuum engineering for high harmonic generation experiment
- Mentored 9 undergraduate research projects
- Plasmonic and beam dynamics simulations
- Novel multipole magnet design
- Fabrication of nanoscale structures with anisotropic wet etches of silicon wafers

AEgIS Collaboration, CERN

RESEARCHER

Meyrin, Switzerland

Feb. 2015 - May 2016

- Antiproton beam dynamics simulations
- Ion optics design and manufacturing: incl. einzel lenses, hemispheric analyzers, and Penning traps

Mars Atmosphere and Volatile Evolution (MAVEN) Mission, NASA

PARTICIPATING SCIENTIST

Boulder, CO

2013 - 2015

- Data mining and analysis for characterization of daily Martian ionosphere measurements

Center for Space Physics

UNDERGRADUATE RESEARCH STUDENT

Boston, MA

2012 - 2014

- semi-empirical modeling of peak electron density and total electron content of Martian ionosphere
- web design and maintenance of Mars International Reference Ionosphere (MIRI) website

TEACHING

UCLA Department of Physics and Astronomy

TEACHING ASSISTANT

Los Angeles, CA

April. 2019 - June. 2019

- Upper division lab for physics majors
- Aided in curriculum redesign focusing more on scripting and data analysis with statistical software packages

Boston University Physics Department

LEARNING ASSISTANT

- Ran discussions with graduate teaching assistant, and held independent office hours to assist students
- Taught introductory electromagnetism course for pre-medical students and advanced lab course for graduate students

Boston, MA

Sept. 2014 - Dec. 2015

Boston University Physics Department

LABORATORY TECHNICIAN

- Maintained physics demonstration stock room for department.
- Designed and created new demonstrations of physical phenomenon for classes and special events.

Boston, MA

Sept. 2012 - Dec. 2015

Museum of Science

SciCORE INTERN

- Educated visitors and taught/interpreted exhibits for them.
- Designed exhibit displays and interpretations for use with the general public.
- Trained new staff and volunteers.

Boston, MA

2011

Selected Publications

- N. Majernik et al., "Demonstration FELs Using UC-XFEL Technologies at the SAMURAI Laboratory", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 1592-1595.
- A. Fukasawa et al., "Advanced Photoinjector Development at the UCLA SAMURAI Laboratory", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 2728-2731.
- G.E. Lawler et al., "RF Testbed for Cryogenic Photoemission Studies", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 2810-2813.
- G.E. Lawler, J.I. Mann, J.B. Rosenzweig, R.J. Roussel, and V.S. Yu, "Initial Nanoblade-Enhanced Laser-Induced Cathode Emission Measurements", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 2814-2817.
- G.E. Lawler, N. Majernik, and J.B. Rosenzweig, "Cryogenic Component and Material Testing for Compact Electron Beamlines", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 2818-2821.
- J.I. Mann, T. Arias, G.E. Lawler, J.K. Nangoi, and J.B. Rosenzweig, "Simulations of Nanoblade-Enhanced Laser-Induced Cathode Emissions and Analyses of Yield, MTE, and Brightness", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 2957-2960.
- J.B. Rosenzweig et al., "Physics Goals of DWA Experiments at FACET-II", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 3922-3925.
- Y.Z. Shao, G.E. Lawler, B. Naranjo, and J.B. Rosenzweig, "Tapered Modular Quadrupole Magnet to Reduce Higher-Order Optical Aberrations", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 4429-4431.
- V.S. Yu, C.E. Hansel, G.E. Lawler, J.I. Mann, M. Mills, and J.B. Rosenzweig, "Magneto-Optical Trap Cathode for High Brightness Applications", in Proc. IPAC'21, Campinas, SP, Brazil, May 2021, pp. 4466-4469.
- JB Rosenzweig, et al. "An Ultra-Compact X-Ray Free-Electron Laser" New Journal of Physics 22 (9), 093067
- Mann, J.; Lawler, G.; Rosenzweig, J. 1D Quantum Simulations of Electron Rescattering with Metallic Nanoblades. Instruments 2019, 3, 59.
- Lawler, G. et al. Electron Diagnostics for Extreme High Brightness Nano-Blade Field Emission Cathodes. Instruments 2019, 3, 57.
- Rosenzweig R., et al. "Ultra-high brightness electron beams from very-high field cryogenic radiofrequency photocathode sources", Nucl. Instrum. Methods Phys.Res., Sect. A909, 224 (2018).

Volunteering

UCLA Exploring Your Universe

BOOTH LEADER

- Designed, constructed, and presenting demonstration of electrostatic particle acceleration
- Educational booth visited by over 50 students per hour in the 1st-6th grade age range

Los Angeles, CA

November 2019

IEEE Try Engineering Together

MENTOR

- Correspondence between 3rd grade mentee as part of elementary school educational curriculum
- Discussed engineering principles and reviewed age appropriate articles with supervision of elementary school instructor

Los Angeles, CA

September 2019 - Present

UCLA Astronomy Live!

VOLUNTEER EDUCATOR

- Demonstrate physics principles via water rockets to students grade 3

Los Angeles, CA

January 2019 - Present

Professional Organizations

2018- **IEEE**, Nuclear and Plasma Sciences Society; Photonics Society; Young Professionals

USA

2018- **Society of Photographic Instrumentation Engineers (SPIE)**,

USA

American Physical Society (APS), Physics of Beams (DPB); Plasma Physics (DPP); Physics and Society (FPS); Laser Science (DLS); International Physics (FIP); Industrial and Applied Physics (FIAP); Graduate Student Affairs (FGSA); Far West Section (FWS); Early Career Scientists (FECS)

USA