Gerard E. **Lawler**

Graduate student · Accelerator physicist

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Education

University of California, Los Angeles — *Los Angeles, CA*

PhD in Physics (ongoing) — *Sept. 2016 - Present*

University of California, Los Angeles — *Los Angeles, CA*

Masters in Physics — *Sept. 2016 - Sept. 2017*

Boston University — *Boston, MA*

Bachelors in Physics, Cum Laude with Departmental Honors — *Sept. 2012 - May 2016*

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

Experience

Research

Particle Beam Physics Laboratory (PBPL), UCLA — *Los Angeles, CA*

Graduate Student Researcher — *Aug. 2016 - Present*

- Cryogenic hardware design for RF cavity accelerator
- Laser optics and vacuum engineering for high harmonic generation experiment
- Teaching and management of up to 6 undergraduate research projects
- Plasmonic and beam dynamics simulations for surface studies involved in high harmonic generation
- Novel multipole magnet design
- Fabrication of nanoscales structures with anisotropic wet etches of silicon wafers

AEgIS Collaboration, CERN — *Meyrin, Switzerland*

Researcher — *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 — *Boulder, CO*

Participating Scientist — *2013 - 2015*

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

Center for Space Physics — *Boston, MA*

Undergraduate Research Student — *2012 - 2014*

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

Teaching

UCLA Department of Physics and Astronomy — *Los Angeles, CA*

Teaching Assistant — *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 — *Boston, MA*

Learning Assistant — *Sept. 2014 - Dec. 2015*

- 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 University Physics Department — *Boston, MA*

Laboratory Technician — *Sept. 2012 - Dec. 2015*

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

Museum of Science *Boston, MA*

SciCORE Intern *2011*

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

Volunteering

UCLA Exploring Your Universe *Los Angeles, CA*

Booth Leader *November 2019*

- 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

IEEE Try Engineering Together *Los Angeles, CA*

Mentor *September 2019 - Present*

- 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

UCLA Astronomy Live! *Los Angeles, CA*

Volunteer Educator *January 2019 - Present*

- Demonstrate physics principles via water rockets to students grade 3

Latino STEM Alliance *Jamaica Plain, MA.*

Assistant Robotics Teacher *2012*

- Assisted in design and implementation of robotics curriculum using Vex and Lego Mindstorm robotics kits.
- Taught students ranging from grades 3 to 9.

New England Wildlife Center *Weymouth, MA*

Volunteer Educator *2010 - 2011*

Northeastern University Ask An Engineer Program *Boston, MA*

Volunteer Educator *2010 - 2011*

Museum of Science, Boston *Boston, MA*

Volunteer Educator *2010 - 2011*

Students Mentored

2021	**Jake Parsons**, UCLA	*California, USA*
2021	**Nathan Montanez**, UCLA	*California, USA*
2021	**Lavanya Pandey**, UCLA	*California, USA*
2019-2020	**Oliver Shao**, UCLA	*California, USA*
2019-2020	**Arathi Suraj**, UCLA	*California, USA*
2019-2020	**Will**, UCLA	*California, USA*
2018-2021	**Victor Yu**, UCLA	*California, USA*
2018	**Yumeng Zhuang**, UCLA	*California, USA*
2017-2019	**Kunal Sanwalka**, UCLA	*California, USA*
2015-2016	**Silvia Zhang**, BU	*Massachusetts, USA*

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.
- BS Nicks et al. “High-Density Dynamics of Laser Wakefield Acceleration from Gas Plasmas to Nanotubes” Photonics 8 (6), 216
- GE Lawler, N Majernik, A Fukasawa, Y Sakai, JB Rosenzweig “ Cryocooler Technology for Electron Particle Accelerators”
- BS Nicks, et al., “Electron dynamics in the high-density laser-wakefield acceleration regime” Phys. Rev. Accel. Beams (Submitted)
- JB Rosenzweig, et al. ”An Ultra-Compact X-Ray Free-Electron Laser” New Journal of Physics 22 (9), 093067
- G Lawler, et al. ”UCLA Facility for Development and Testing of Novel Photoinjectors” - Bulletin of the American Physical Society, 2020
- JB Rosenzweig, et al. ”An Ultra-Compact X-Ray Free-Electron Laser” arXiv preprint arXiv:2003.06083
- R. Roussel, et al. Single Shot Characterization of High Transformer Ratio Wakefields in Nonlinear Plasma Acceleration Phys. Rev. Lett. 124, 044802 – Published 31 January 2020
- 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.
- Roussel, R., et al. Externally Heated Hollow Cathode Arc Plasma Source for Experiments in Plasma Wakefield Acceleration. Instruments 2019, 3, 48.
- 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).
- Rosenzweig, et al., Adiabatic plasma lens experiments at SPARC, Nucl. Instrum.Methods Phys. Res. A (2018).
- Roussel et al. “Measurement of transformer ratio from ramped beams in the blowout regime”. Nucl. Instrum. Methods Phys.Res., Sec. A909:130 – 133, 2018.
- M Turner, et al. ”arXiv: Compact ring-based X-ray source with on-orbit and on-energy laser-plasma injection” NAPAC2016
- Turner, Marlene, et al. “Compact ring-based X-ray source with on-orbit and on-energy laser-plasma injection.” arXiv preprint arXiv:1610.05699 (2016).
- Pacifico, N., et al. “Direct detection of antiprotons with the Timepix3 in a new electrostatic selection beamline.” Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 831 (2016): 12-17.
- G Lawler, N Pacifico, AEgIS Collaboration ”Generating a Reduced-energy Antiproton beam using Channeling Electrostatic elements (GRACE)” 2016 APS April Meeting Abstracts
- Mendillo, M., et al. “The equivalent slab thickness of Mars’ ionosphere: Implications for thermospheric temperature.” Geophysical Research Letters 42.9 (2015): 3560-3568.
- Mendillo, M., et al. “Using Ionospheric Slab Thickness Data to Predict MAVEN Observations of Thermospheric Temperatures.” Lunar and Planetary Science Conference. Vol. 46. 2015.
- Mendillo, M., et al. “The Equivalent Slab Thickness of Mars’ Ionosphere.” European Planetary Science Congress 2014, EPSC Abstracts, Vol. 9, id. EPSC2014-51. Vol. 9. 2014.
- Mendillo, Michael, et al. “A new semiempirical model of the peak electron density of the Martian ionosphere.” Geophysical Research Letters 40.20 (2013): 5361-5365.

Professional Organizations

2018-	**IEEE,** Nuclear and Plasma Sciences Society; Photonics Society; Young Professionals	*USA*
2018-	**Society of Photographic Instrumentation Engineers (SPIE),**	*USA*
2016-	**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*

Conferences and Workshops

2022	**Contributed Talk**, MeVArc23	*Chania, Greece (remote)*
2022	**Contributed Talk**, NAPAC22, "Nanopatterned Cathodes"	*Albuquerque, NM, USA*
2022	**Poster Presentation**, IPAC22	*Bangkok, Thailand*
2022	**Invited Talk**, HG22	*Tsinghua, China (Remote)*
2021	**Poster Presentation**, IPAC21	*Campinas, Brazil (remote)*
2020	**Student**, US Particle Accelerator School (USPAS) Winter Session	*San Diego, California, USA*
2019	**Attendee**, 2019 NSF STC Professional Development Workshop	*Indianapolis, Indiana, USA*
2019	**Presenter**, Canadian-American-Mexican Graduate Student Physics Conference 2019	*Sudbury, Ontario, Canada*
2019	**Presenter**, Physics and Applications of High Brightness Beams Workshop	*Rethimno, Crete, Greece*
2019	**Student**, US Particle Accelerator School (USPAS) Winter Session	*Newport News, Virginia, USA*
2017	**Student**, Joint Accelerator School (JAS)	*Tokyo, Japan*
2016	**Student**, US Particle Accelerator School (USPAS) Summer Session	*Boulder, Colorado, USA*
2016	**Presenter**, 2016 APS April Meeting	*Utah, USA*
2016	**Student**, US Particle Accelerator School (USPAS) Winter Session	*Austin, Texas, USA*
2015	**Student**, US Particle Accelerator School (USPAS) Summer Session	*N. Jersey, USA*