

# Gerard Lawler

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## SUMMARY

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I am an early career physicist with extensive experience in RF physics both design and experiment. I am most interested in the applications of physics to industry. To this end, my thesis work focused on enabling significant size and cost reductions to existing normal conducting RF particle accelerators with advanced understanding of surface and material physics especially in the context of extremely high electric fields and cryogenic temperatures.

## SKILLS

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Physics simulation	Ansys HFSS, CST, Lumerical, GPT, Astra
Programming	Python, C++, JAVA, Fortran, IDL, Matlab
Other Software	SolidWorks, LTSpice, Mathematica, LaTeX, IDL, ROOT, Matlab, Mathematica, LabVIEW
Operating Systems	Linux (Ubuntu, CentOS, Debian), Windows
Lab skills	RF design and measurement, cryogenics, ultra-high vacuum, laser optics, pulsed power, microcontrollers, signal processing, fast electronics, nanofabrication

## WORK EXPERIENCE

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**Tibaray Inc., Fremont, CA, Senior R&D Engineer** 2024 - present

- Senior research and development engineer responsible for compact linac development for medical applications
- Design and fabrication of novel high power RF component including circulators, isolators, phase shifters, windows, and RF loads
- Multiphysics and CAD mechanical simulations
- RF component cold testing and quality management
- Linac vault operation

**Particle Beam Physics Laboratory (PBPL), UCLA, Researcher** 2016 - 2024

- Commissioning of new CYBORG (CrYogenic Brightness-Optimized Radiofrequency Gun) beamline for photoemission and RF testing including development of S.O.P.
- Multiphysics simulation and RF cavity design and measurement
- Cryogenic hardware design for RF cavity accelerator
- Laser optics and vacuum engineering for high harmonic generation experiment
- Teaching and management of multiple teams of undergraduate research projects
- Plasmonic and beam dynamics simulations for surface studies involved in high harmonic generation
- Novel multipole magnet design
- Fabrication of nanoscale structures with anisotropic wet etches of silicon wafers

- Antiproton beam dynamics simulations
- Ion optics design and manufacturing: incl. einzel lenses, hemispheric analyzers, and Penning traps
- Commissioning of UHV beamline elements on Antiproton Decelerator

## EDUCATION

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- PhD in Physics **University of California, Los Angeles**  
Thesis: *Improvements to Normal Conducting High Gradient Accelerator Performance at Cryogenic Temperatures*
- MS in Physics **University of California, Los Angeles**
- Coursework (4 courses, 12 credit hours) **US Particle Accelerator School**
- BA in Physics, *cum laude* with distinction **Boston University**  
Senior Honors Thesis: *Design and Analysis of Permanent Magnet Penning Trap for AEGIS Collaborations Antiproton-beam Studies*

## SELECTED PUBLICATIONS

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- Rosenzweig, J.B. et al. (2018). “Ultra-high brightness electron beams from very-high field cryogenic radiofrequency photocathode sources”. In: *Nucl Instrum and Meth A* 909. 3rd European Advanced Accelerator Concepts workshop (EAAC2017), pp. 224–228. DOI: [10.1016/j.nima.2018.01.061](https://doi.org/10.1016/j.nima.2018.01.061).
- Lawler, Gerard, Kunal Sanwalka, et al. (2019). “Electron Diagnostics for Extreme High Brightness Nano-Blade Field Emission Cathodes”. In: *Instruments* 3.4. DOI: [10.3390/instruments3040057](https://doi.org/10.3390/instruments3040057).
- Rosenzweig, J B et al. (Sept. 2020). “An ultra-compact x-ray free-electron laser”. In: *New Journal of Physics* 22.9, p. 093067. DOI: [10.1088/1367-2630/abb16c](https://doi.org/10.1088/1367-2630/abb16c).
- Lawler, Gerard et al. (2023). *Improving Interface Physics Understanding in High-Frequency Cryogenic Normal Conducting Cavities*. arXiv: [2310.11578](https://arxiv.org/abs/2310.11578) [[physics.acc-ph](https://arxiv.org/archive/physics)].
- Lawler, Gerard Emile et al. (2024). “Improving Cathode Testing with a High-Gradient Cryogenic Normal Conducting RF Photogun”. In: *Instruments* 8.1. test 1. ISSN: 2410-390X. DOI: [10.3390/instruments8010014](https://doi.org/10.3390/instruments8010014).
- Rosenzweig, James B. et al. (2024). “A High-Flux Compact X-ray Free-Electron Laser for Next-Generation Chip Metrology Needs”. In: *Instruments* 8.1. ISSN: 2410-390X. DOI: [10.3390/instruments8010019](https://doi.org/10.3390/instruments8010019).