



**Exponent<sup>®</sup>**  
Engineering & Scientific Consulting

## Erik Urban, Ph.D., CFEI

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### Professional Profile

Dr. Urban utilizes his knowledge and experience with electronic system design, application, and implementation to assist clients with a wide variety of projects. He has performed numerous proactive design reviews as well as reactive failure analyses for consumer and commercial products.

Dr. Urban's work often includes design reviews, forced failure analyses, and/or engineering analysis of electrical systems. Dr. Urban also has experience with automotive electronics, power quality studies, code and standard reviews, and control system design. Dr. Urban has performed several source code reviews and has expertise with simulation, experimental control, and data analysis/visualization in Python as well as familiarity with both C, MatLAB, and LabView. Dr. Urban's projects have further involved investigations related to fires and explosions, industrial accidents, electrocutions/shock injuries, and control system failures.

Dr. Erik Urban has an extensive background in atomic physics, with expertise in the control and measurement of trapped ions and in the development of related hardware and experimental systems. This experience includes knowledge of radio-frequency electronics, printed circuit board (PCB) debugging and design, electrostatic field simulations, optical lasers, and ultra-high vacuum systems.

Prior to joining Exponent, Dr. Urban obtained his Ph.D. from the University of California, Berkeley as a National Science Foundation Graduate Research Fellow in the field of experimental atomic physics. His research included design, implementation, and characterization of novel ion traps for the study of fundamental quantum interactions and new quantum controls to aid in the development of quantum technologies.

Dr. Urban's doctoral work required the use of visible lasers/optics systems, ultra-high vacuum components, and both radio-frequency (RF) and DC electronics. Specifically, frequency-locked lasers manipulate the internal state of the atom, RF electronics control the laser frequency at a given time and generate electric fields to trap the charged particles, and DC electronics control both the sub-microsecond timing of the experiment and the fields experienced by the ions. He also designed electrostatic simulations to model atom dynamics and implemented the results to manipulate their motion.

### Academic Credentials & Professional Honors

Ph.D., Physics, University of California, Berkeley, 2019

M.A., Physics, University of California, Berkeley, 2017

B.A., Chemical Physics, Hendrix College, 2013

National Science Foundation Graduate Research Fellow, 2014-2019

Goldwater Scholar, 2012-2013

Phi Beta Kappa Honor Society

## Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

IPAF Operator Training Certificate - Static Vertical (1a), Mobile Vertical (3a), Mobile Boom (3b)

## Prior Experience

Graduate Research Assistant, University of California, Berkeley, 2014-2019

Graduate Student Instructor, University of California, Berkeley, 2013-2014

Intern, Jefferson National Laboratory, 2012

## Publications

An D, Matthiesen C, Urban E, Haeffner H, **Distance scaling and polarization of electric-field noise in a surface ion trap**. Physical Review A 100, 063405 (2019)

Urban E, Glikin N, Mouradian S, Krimmel K, Hemmerling B, Haeffner H, **Coherent control of the rotational degree of freedom of a two-ion coulomb crystal**. Physical Review Letters 123, 133202 (2019)

An D, Matthiesen C, Abdelrahman A, Berlin-Udi M, Gorman D, Möller S, Urban E, Haeffner H, **Surface trap with dc-tunable ion-electrode distance**. Review of Scientific Instruments 89, 093102 (2018)

Li HK\*, Urban E\*, Noel C, Chuang A, Xia Y, Ransford A, Hemmerling B, Wang Y, Li T, Haeffner H, Zhang X. **Realization of translational symmetry in trapped cold ion rings**. Physical Review Letters 118, 053001 (2017)

Magee et. al. **A novel comparison of Moller and Compton electron-beam polarimeters**. Physics Letters B, Volume 766 (2017)

## Presentations

Urban E, Glikin N, Mouradian S, Haeffner H. Coherent Control of Angular Momentum States with a Freely Rotating Coulomb Crystal, Southwest Quantum Information and Technology Workshop, Albuquerque, NM, 2019.

Urban E, Glikin N, Hemmerling B, Haeffner H. Investigating Particle Indistinguishability with a Freely Rotating Coulomb Crystal, International Conference on Atomic Physics, Barcelona, Spain, 2018.

Urban E, Li HK, Hemmerling B, Haeffner H. Transnationally invariant trapped ion rings. Division of Atomic Molecular and Optical Physics APS Meeting, Sacramento, CA, 2017.

Urban E, Haeffner H. Towards a new class of trapped ion experiments with ion rings. Southwest Quantum Information and Technology Workshop, Albuquerque, NM, 2016.

Urban E, Gaskell D. Monte Carlo Studies of the Hall C Compton Polarimeter. The American Physical Society April Meeting, Denver, CO, 2013.