James W. Kingston
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EDUCATION

University of California, Davis 2026
- Physics, PhD (GPA: 4.0)

University of Chicago 2019
- Physics, Masters

University of California, Berkeley 2017
- Physics and Applied Mathematics, Bachelors

SKILLS

Operating Systems: UNIX/Linux, Windows
Programming Languages: Python, C++, Bash
Software: NumPy, Matplotlib, SciPy, COMSOL, SolidWorks, ROOT, KiCad
Hardware: High Vacuum Systems, Noble Element Cryogenics, High Voltage (HV), Electronics, Soldering, Machine Shop Proficiency, Orbital Welding

PROFESSIONAL EXPERIENCE

Graduate Student Researcher, Rare Event Detection Group May 2021 – May 2026
Lawrence Livermore National Laboratory, Livermore CA 94550

- Studied properties of electroluminescence light in the CHILLAX detector, the world's first dual phase xenon-doped argon time projection chamber (TPC), culminating in a first-author paper.
- Analyzed scintillation waveforms captured by Silicon Photomultipliers (SiPMs) from CHILLAX, including:
  - Scrutinizing individual event waveforms to tune pulse-finding and baseline-finding algorithms.
  - Analyzing reduced quantities (RQs) to perform data quality cuts.
  - Performing statistical analyses on RQs to draw conclusions about data.
- Designed and built a TPC for CHILLAX, which hosts a 35 g active target, 6 SiPMs, and over 6 kV/cm drift field.
- Set up analog electronic scheme for amplifying, filtering, and triggering SiPM signals allowing for single photoelectron (SPE) sensitivity in each channel.
- Developed and built cryogenics for CHILLAX which proved capable of stable operation at 5% xenon concentration, resulting in a publication.
- Built a gas panel for purifying, circulating, precision doping, and mixing of noble gases.
- Designed and constructed an electronics rack for mounting and wiring all electronics for CHILLAX, which includes kempt routing of hundreds of wires for over 50 instruments.
- Designed and instrumented a cryogenic capacitor sensitive to 1 fF shifts corresponding to 0.01% changes to the xenon concentration in liquid argon.

- Conceived and built a bubble routing device to direct undesired bubbles away from the detector liquid volume, stabilizing the liquid surface
- Characterized SiPM dark rate, crosstalk, afterpulsing, and photon detection efficiency (PDE) in a liquid argon environment with direct argon scintillation light, resulting in a publication.

Assistant Specialist, Pantic Group September 2019 – August 2020
Department of Physics, UC Davis, Davis CA 95616

- Worked in a team to develop a mockup of the DarkSide-20k argon detector for HV studies.
- Performed a COMSOL electric field simulation to find the optimal HV cable properties for minimizing an electric field hotspot.
- Designed and built a 10' crane frame to lift the mockup cryostat flange for maintenance.
- Designed a cryogenic camera for viewing HV sparking inside the cryostat.

Graduate Researcher, Grandi Group September 2018 – June 2019
Kavli Institute for Cosmological Physics, University of Chicago, Chicago IL 60615

- Operated and collected data with a dual-phase xenon TPC.
- Expanded on existing Geant4 simulations to measure geometric efficiency of photomultiplier tubes (PMTs).
- Designed and implemented a level meter inside the xenon detector for precision measurements of the gas-liquid interface.
- Analyzed data using techniques such as pulse-shape discrimination and event position-reconstruction.
- Calibrated the detector with krypton-83 gammas and measured the half-life of decays with 3% precision.

Research Assistant, Rare Event Detection Group June 2016 – August 2018
Lawrence Livermore National Laboratory, Livermore CA 94550

- Worked in a team to design and build XeNu, a dual-phase xenon TPC.
- Made 3D potential and electric field simulations of the detector volume.
- Calibrated detector response to single photoelectrons and single electrons.
- Assisted in operating XeNu TPC HV at liquid drift fields up to 10.4 kV/cm for electron extraction efficiency measurements, the highest achieved to date in a dual-phase xenon detector.
- Commissioned detector at Triangle Universities Nuclear Laboratory to study low energy nuclear recoils from a neutron beam, where the ionization yield of 0.3 keV nuclear recoils was measured for the first time.

Undergraduate Researcher, CMS Group July 2017 – September 2017
Deutsches Elektronen-Synchrotron (DESY), Hamburg Germany 22607

- Added commands to a program that sent instructions to and read data from a new pixel readout chip.
- Wrote code to send a calibration pulse to the readout chip and draw the resulting signal pulse shape.

- Characterized the chip by determining the dependence of features of the pulse shape (e.g. amplitude, peaking time) on various parameters of the chip that could be modified by the user.
- Optimized the chip for usage in the DESY electron test beam.

CERTIFICATIONS

Machine Shop Class April 2023 – September 2023

UC Davis Mathematical and Physical Science Division Machine Shop, Davis CA 95616

- Learned basic machine tool and shop safety, fundamentals of precision measuring, introduction to materials.
- Operated lathes, milling machines, and other powered shop equipment.
- Read and made computer-aided design (CAD) drawings.
- Applied skills to build a functional tape dispenser composed of self-machined parts made of aluminum, acrylic, and stainless steel.

PUBLICATIONS

1. **J. Kingston**, J. Qi, J. Xu, E. Bernard, A. Tidball, A. Peck, N. Bowden, M. Tripathi, K. Ni, S. Westerdale, "Gas Electroluminescence in a Dual Phase Xenon-Doped Argon Detector", Phys. Rev. D 113, 032016 (February 2026)

2. J. Xu, D. Adams, B. Lenardo, T. Pershing, R. Mannino, E. Bernard, **J. Kingston**, E. Mizrachi, J. Lin, R. Essig, V. Mozin, P. Kerr, A. Bernstein, M. Tripathi "Search for the Migdal effect in liquid xenon with keV-level nuclear recoils", Phys. Rev. D 109, L051101 (March 2024)

3. E. Bernard, E. Mizrachi, **J. Kingston**, J. Xu, S. Pereverzev, T. Pershing, R. Smith, C. Prior, N. S. Bowden, A. Bernstein, C. Hall, E. Pantic, M. Tripathi, D. McKinsey, P. Barbeau, "Thermodynamic Stability of Xenon-Doped Liquid Argon Detectors", Phys. Rev. C 108, 045503 (October 2023)

4. T. Pershing, D. Naim, B. Lenardo, J. Xu, **J. Kingston**, E. Mizrachi, V. Mozin, P. Kerr, S. Pereverzev, A. Bernstein, M. Tripathi, "Calibrating the scintillation and ionization responses of xenon recoils for high-energy dark matter searches", Phys. Rev. D 106, 052013 (September 2022)

5. T. Pershing, J. Xu, E. Bernard, **J. Kingston,** E. Mizrachi, J. Brodsky, A. Razeto, P. Kachru, A. Bernstein, E. Pantic, I. Jovanovic, "Performance of Hamamatsu VUV4 SiPMs for detecting liquid argon scintillation", JINST 17, P04017 (May 2022)

6. B. Lenardo, J. Xu, S. Pereverzev, O. Akindele, D. Naim, **J. Kingston**, A. Bernstein, K. Kazkaz, M. Tripathi, C. Awe, L. Li, J. Runge, S. Hedges, P. An, and P. Barbeau, "Low-energy physics reach of xenon detectors for nuclear-recoil-based dark matter and neutrino experiments", Phys. Rev. Lett. 123, 231106 (December 2019)

7. J. Xu, S. Pereverzev, B. Lenardo, **J. Kingston**, D. Naim, A. Bernstein, K. Kazkaz, M. Tripathi, "Electron extraction efficiency study for dual-phase xenon dark matter experiments", Phys. Rev. D 99, 103024 (May 2019)

ORAL PRESENTATIONS

1. "Gas Electroluminescence in a Dual Phase Xenon-Doped Argon TPC", Light Detection in Noble Elements (Hong Kong, October 2025)

2. "Recent Results of a Xenon-Doped Argon Ionization Detector with the CHILLAX Experiment", American Physical Society (APS) Global Physics Summit (Anaheim, March 2025)

3. "Xenon-Doping of Liquid Argon with the CHILLAX Detector", Nuclear Science and Security Fall Workshop (Livermore, November 2024)

4. "Reactor CEvNS: LXe and LAr Detectors", Workshop on Neutrino Science and Applications at the High Flux Isotope Reactor (Oak Ridge, April 2024)

5. "Studies of Xenon-Doped Argon with the CHILLAX Experiment", Coordinating Panel on Advanced Detectors (Menlo Park, November 2023)

6. "Capacitive Monitoring of Xenon Concentration in a Xenon-Doped Argon Detector", Coordinating Panel on Advanced Detectors (Stony Brook, November 2022)

7. "Characterization of Hamamatsu VUV4 Silicon Photomultipliers using Argon Scintillation Light", APS Grad Slam Lightning Talk **(Winner, Awarded 1 Year of APS Free Membership)** (New York City, April 2022)

8. "Characterization of Hamamatsu VUV4 Silicon Photomultipliers using Argon Scintillation Light", APS April Meeting (New York City, April 2022)

FELLOWSHIPS AND AWARDS

1. Professor Emerita Ling-Lie Chau Prize for Excellence in Graduate Studies (June 2025)
2. Nuclear Science and Security Consortium (NSSC) Best National Laboratory Collaboration Award (June 2024)
3. UC Davis Graduate Program Fellowship (Spring 2024)
4. High Energy Physics Consortium for Advanced Training (HEPCAT) Fellowship (2023-2024)
5. NSSC Graduate Fellow (2021-2026)
6. NSSC Undergraduate Fellow (2016-2017)

OUTREACH

1. Lab Instructor, HEPCAT Summer School Summer 2022, 2023, 2024
   - Deployed a minimal liquid argon scintillation detector for demonstration at the HEPCAT Summer School.

- Instructed students on basics of safely operating vacuum, high pressure, and cryogenic hardware.
- Guided multiple small groups of students to submerge the detector's SiPMs in approximately half a liter of liquid argon.
- Utilized a radioactive source to increase the detector event rate and demonstrate the SiPMs' sensitivity to liquid argon scintillation light.

TEACHING EXPERIENCE

1. Physics 80, UC Davis — Spring 2021
   - Taught a lab section for a python data analysis course for physics majors.
   - Wrote solutions for and graded assignments.

2. Physics 9B, UC Davis — Winter 2021
   - Held weekly office hours for an introductory electromagnetism course for physics majors.
   - Wrote solutions for and graded assignments.

3. Physics 7A, UC Davis — Fall 2020
   - Taught a lab and discussion section for an introductory conservation principles course for non-physics majors.
   - Graded lab assignments.