Emma Berger
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Curriculum Vitae
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Research Interests

In the Crommie group (UC Berkeley, Physics) I am a 4th year PhD student using scanning tunneling microscopy combined with electron spin resonance to study novel quantum systems at the atomic scale. My expertise lies in characterizing quantum systems using home-built instrumentation (microwave circuitry, cryogenics, hardware design) and designing novel fundamental physics experiments. I'm interested in pursuing a career in the quantum computing industry as an experimental physicist.

Education

- **University of California, Berkeley** — 2019 –
  PhD Candidate, Physical Chemistry, NSF GRFP Fellow — GPA: 3.96/4.00
- **Colby College** — 2014 – 2017
  B.A. Chemistry (Magna Cum Laude, Phi Beta Kappa) — GPA: 3.90/4.00

Experience

- **IBM** — Summer 2023
  Incoming Quantum Research PhD Intern
- **University of California, Berkeley** (Group of Dr. Mike Crommie) — 2021 -
  STM-ESR of single-molecule magnets and magnetic defects in materials
- **University of California, Berkeley** (Group of Dr. Michael Zuerch) — 2019 - 2021
  Ultrafast x-ray spectroscopy and diffraction of quantum materials
- **Lawrence Livermore National Laboratory** (Group of Dr. Harris Mason) — 2018
  Solid State NMR spectroscopy of Pu adsorption to mineral particulates
- **Colby College** (Group of Dr. Nicholas Boekelheide) — 2016 – 2017
  Molecular dynamics simulations of enzymatic hydrogen transfer reactions
- **Colby College** (Group of Dr. D. Whitney King) — 2015 – 2017
  Measuring antioxidant and nitrogen concentrations in fresh water systems

Relevant Technical Skills/Coursework

- Python (Qiskit, QuTIP), Hardware control (LabVIEW), Solidworks, Mathematica, RF circuit design, solid state quantum hardware, ultrahigh vacuum, cryogenic instrumentation, ultrafast optics

Teaching and Outreach

- **Physics Directed Reading Program Mentor** — 2021 –
- **SPLASH Volunteer** — 2020 –
- **Bay Area Scientists in Schools Volunteer** — 2020 –
- **Shield the Bay Volunteer: 3D-printing face shields for COVID-19** — 2020
- **University of California, Berkeley, Graduate Student Instructor** — 2019 – 2020
  CH125: Experimental Physical Chemistry, CH32: General Chemistry
- **Phillips Academy at Andover, Chemistry Teaching Fellow** — 2017 – 2019
  CH250: General Chemistry, CH300: College Chemistry

Awards

Selected to attend 2022 Lindau Nobel Laureate Meeting	2022
NSF Graduate Research Fellow	2021-2024
H2H8 Fellowship Awardee	2022
M. Lawrence Shields Endowed Teaching Fellowship	2018
Magna Cum Laude	2017
American Chemical Society Certified Degree	2017

Honors Distinction in Chemistry	2017
Phi Beta Kappa	2017
Top Student in Physical Chemistry	2016
New England Small College Athletic Conference All-Academic Team	2016
Top Student in Analytical Chemistry	2015

Publications

1. **E. Berger**, S. Jamnuch, C.B. Uzundal, C. Woodahl, H. Padmanabhan, A. Amado, P. Manset, Y. Hirata, Y. Kubota, S. Owada, K. Tono, M. Yabashi, C. Wang, Y. Shi, V. Gopalan, C.P. Schwartz, W.S. Drisdell, I. Matsuda, J.W. Freeland, T.A. Pascal, and M. Zuerch
   Extreme Ultraviolet Second Harmonic Generation Spectroscopy in a Polar Metal
   Nano Letters 21, 6095–6101 (2021)
   - *Featured as cover article*

2. T. Helk*, **E. Berger*,** S. Jamnuch*, L. Hoffmann, A. Kabacinski, J. Gautier, F. Tissandier, J. P. Goddet, H.-T. Chang, J. Oh, C. D. Pemmaraju, T. A. Pascal, S. Sebban, C. Spielmann, M. Zuerch
   Table-top extreme ultraviolet second harmonic generation
   Science Advances 7, eabe2265 (2021)
   - **Co-first author*
   - *Featured as cover article*

3. B. Buades, A. Picon, **E. Berger**, I. Leon, N. Di Palo, S. L. Cousin, C. Cocchi, E. Pellegrin, J. H. Martin, S. Manas-Valero, E. Coronado, T. Danz, C. Draxl, M. Uemoto, K. Yabana, M. Schultze, S. Wall, M. Zuerch, J. Biegert
   Attosecond state-resolved carrier motion in quantum materials probed by soft X-ray XANES
   Applied Physics Reviews 8, 011408 (2021)
   - *AIP Feature Article*

4. C. B. Uzundal, S. Jamnuch, **E. Berger**, C. Woodahl, P. Manset, Y. Hirata, T. Sumi, A. Amado, H. Akai, Y. Kubota, S. Owada, K. Tono, M. Yabashi, J. W. Freeland, C. P. Schwartz, W. S. Drisdell, I. Matsuda, T. A. Pascal, A. Zong, M. Zuerch
   Polarization-Resolved Extreme Ultraviolet Second Harmonic Generation from $LiNbO_3$
   Physical Review Letters, **127**, 237402*,* (2021)

5. **E. Berger**, N. Boekelheide
   Modeling the Quantum Dynamics of Hydrogen Transfer Reactions in Enzyme Catalysis
   Colby College Chemistry Department Honors Thesis, (2017)

6. D.W. King, **E. Berger**, Z. Helm, E. Irish, K. Mopper
   Measurement of Antioxidant Activity Towards Superoxide in Natural Waters
   Frontiers in Marine Science (2017)

Conference Presentations

1. Second Harmonic Generation Using a Seeded Soft X-ray Laser
   Contributed Talk, APS March Meeting (Virtual), March 17, 2021

2. XUV Second Harmonic Generation of a Polar Metal with Elemental Specificity
   Contributed Poster, APS March Meeting (Virtual), March 17, 2021.

3. Direct Observation of Symmetry Breaking in a Polar Metal
   Lecture Presentation, Graduate Research Conference, October 1, 2020

4. XUV Second Harmonic Generation of a Polar Metal with Elemental Specificity
   Contributed Talk, DESY Science@FELs (Virtual), September 15, 2020