

Physics Department  
Stanford University  
Stanford, CA 94305

Clarke A. Hardy

🌐 [clarkehardy.com](http://clarkehardy.com)  
✉ [cahardy@stanford.edu](mailto:cahardy@stanford.edu)  
📞 (669) 600-9549

## EDUCATION

---

**Stanford University**, Stanford, CA  
PhD in Physics Expected 2025

**Queen's University**, Kingston, Canada  
MSc in Physics 2019  
BAsC in Engineering Physics 2018

## RESEARCH EXPERIENCE

---

**Graduate Research Assistant**, Optically-Levitated Microspheres Lab  
Stanford University 2023 – Present

- Developed techniques for in-situ noise & background witnessing to improve sensitivity
- Built analysis pipeline to test for modifications to Newtonian gravity at short distances

**Graduate Research Assistant**, nEXO Neutrinoless Double Beta Decay Search  
Stanford University 2020 – Present

- Designed, constructed, & characterized a new xenon purifier to mitigate radon backgrounds
- Developed light collection efficiency calibration scheme using an internal  $^{127}\text{Xe}$  source
- Built, maintained, & operated two test platforms for nEXO R&D at Stanford

**Graduate Research Assistant**, LZ Dark Matter Search  
SLAC National Accelerator Laboratory 2019 – 2020

- Modelled sensitivity of the LZ detector to leptophilic dark matter

**Graduate Research Assistant**, PICO Dark Matter Search  
Queen's University & SNOLAB 2018 – 2019

- Modelled sensitivity of PICO-40L to  $\text{CE}\nu\text{NS}$  and annual modulations in a DM signal
- Assisted with commissioning of the PICO-40L detector at SNOLAB
- Improved PICO-40L image quality by designing, fabricating, & installing a new retroreflector

**Undergraduate Research Assistant**, PICO Dark Matter Search  
Queen's University 2017 – 2018

- Performed ray tracing simulations & reflectivity tests for PICO-40L retroreflector design

**Undergraduate Research Assistant**, NEWS-G Dark Matter Search  
Queen's University Summer 2016

- Developed & tested new calibration schemes using UV laser & external sources
- Designed & implemented slow controls readout electronics & software

## HONORS & AWARDS

---

**NSERC Postgraduate Scholarship – Doctoral**  
National Sciences and Engineering Research Council of Canada 2020

**\*Alexander Graham Bell Canada Graduate Scholarship – Doctoral**  
National Sciences and Engineering Research Council of Canada 2020

**\*Clarendon Scholarship**  
University of Oxford 2019

**\*Berkeley Fellowship for Graduate Study**  
University of California, Berkeley 2019

**Queen's CAP Prize Examination Award**  
Queen's University 2019

<b>R. Samuel McLaughlin Fellowship</b> Queen's University	2018
<b>NSERC Undergraduate Student Research Award</b> Queen's University	2017
<b>First Place, particle physics category</b> Canadian Undergraduate Physics Conference	2017
<b>Ontario Professional Engineers Foundation Scholarship</b> Queen's University	2015
<b>Principal's Scholarship</b> Queen's University	2014
* declined award	

## WORKSHOPS

---

<b>Tri-Institute School on Elementary Particles (TRISEP)</b> Perimeter Institute for Theoretical Physics	June 2023
◦ Workshop spanning two weeks with sessions from invited researchers on the Standard Model, BSM physics, dark sector theory, amplitude techniques, EFT methods for gravity, gravitational wave theory, gravitational wave experiments, collider experiments, particle astrophysics observations, cosmology, and axions	

## TEACHING EXPERIENCE

---

<b>Co-Instructor</b> , <i>PHY 154: Physics I with Lab</i> , Mount Tamalpais College	Fall 2024
<b>Co-Instructor</b> , <i>Summer Science Circle</i> , Mount Tamalpais College	Summer 2023
<b>Lead Instructor</b> , <i>PHY 154: Physics I with Lab</i> , Mount Tamalpais College	Fall 2022
<b>Co-Instructor</b> , <i>MTH 220: Precalculus I</i> , Mount Tamalpais College	Spring 2022
<b>Teaching Assistant</b> , <i>PH 41: Mechanics</i> , Stanford	Winter 2022
<b>Teaching Assistant</b> , <i>PH 25: Modern Physics</i> , Stanford	Spring 2020
<b>Teaching Assistant</b> , <i>PH 23: Electricity, Magnetism, &amp; Optics</i> , Stanford	Winter 2020
<b>Teaching Assistant</b> , <i>APSC 111: Mechanics</i> , Queen's	Fall 2018

## SERVICE & OUTREACH

---

<b>Volunteer Mentor</b> nEXO Collaboration Mentorship Program	2024 – Present
<b>Volunteer Faculty</b> Mount Tamalpais College	2022 – Present
◦ Served on faculty at a college for the incarcerated population at San Quentin State Prison	
◦ Developed & taught multiple courses in physics & math	
<b>McDonald Institute Ambassador</b> Arthur B. McDonald Canadian Astroparticle Physics Research Institute	2018 – 2019
◦ Hosted school groups & gave tours of the McDonald Institute Visitor Center	
◦ Assisted with regular outreach events within the community	

## CONFERENCES & TALKS

---

1. "Searching for new physics at the micron scale with optically levitated microspheres," APS April Meeting, Sacramento, CA, April 2024
2. \*"Optimizing energy reconstruction for nEXO", Topics in Astroparticle and Underground Physics (TAUP) 2023, Vienna, Austria, September 2023

3. \**“Searching for Neutrinoless Double Beta Decay with nEXO”*, TRISEP 2023, Waterloo, Canada, June 2023
  4. †*“In Search of No Neutrinos: the nEXO Experiment and Detector Calibration”*, Two Sigma PhD Symposium, New York, NY, June 2023
  5. *“Development of a  $^{127}\text{Xe}$  calibration source for nEXO,”* APS April Meeting, New York City, NY, April 2022
  6. *“Development of a high-purity zirconium purifier for nEXO,”* APS Division of Nuclear Physics Fall Meeting (virtual), MIT, October 2021
  7. *“Lightmap reconstruction in nEXO with an internal xenon 127 source,”* Light Detection In Noble Elements (virtual), UC San Diego, September 2021
  8. *“New Outreach Initiatives in Canada with the McDonald Institute,”* European Physical Society High Energy Physics Conference, Ghent, Belgium, July 2019
  9. *“Searching for Dark Matter with PICO-40L,”* European Physical Society High Energy Physics Conference, Ghent, Belgium, July 2019
  10. *“Determining the Physics Reach of the PICO Bubble Chamber Dark Matter Detectors,”* Canadian Association of Physicists Congress, Burnaby, Canada, June 2019
  11. *“Improving the Optics of the PICO Bubble Chamber Dark Matter Detector,”* Winter Nuclear & Particle Physics Conference, Mont Tremblant, Canada, January 2018
  12. *“Improving the Optics and Fiducial Volume of the PICO-40L Dark Matter Detector,”* Canadian Undergraduate Physics Conference, Ottawa, Canada, October 2017
- \* poster presentation  
† invited talk

## PUBLICATIONS

---

1. M. Yvaine [et. al., including **C. A. Hardy**], *“Imaging of single barium atoms in an asymmetric matrix site in solid xenon for barium tagging in a  $^{136}\text{Xe}$  double beta decay experiment,”* submitted to Phys. Rev. A (2024) [arXiv:2407.00285]
2. S. Hedges [et al., including **C. A. Hardy**], *“Supernova Electron-Neutrino Interactions with Xenon in the nEXO Detector,”* submitted to Phys. Rev. D (2024) [arXiv:2405.19419]
3. R.H.M. Tsang [et al., including **C.A. Hardy**], *“An integrated online radioassay data storage and analytics tool for nEXO,”* Nucl. Instrum. Methods Phys. Res. A 1055, 168477 (2023) [arXiv:2304.06180]
4. C. Adams [et al., including **C.A. Hardy**], *“Neutrinoless Double Beta Decay,”* White Paper submitted for the Fundamental Symmetries, Neutrons, and Neutrinos Town Meeting (2022) [arXiv:2212.11099]
5. J. Aalbers [et al., including **C.A. Hardy**], *“A Next-Generation Liquid Xenon Observatory for Dark Matter and Neutrino Physics,”* J. Phys. G: Nucl. Part. Phys. 50, 013001 (2023) [arXiv:2203.02309]
6. G. Gallina [et al., including **C. A. Hardy**], *“Performance of novel VUV-sensitive Silicon Photomultipliers for nEXO,”* Eur. Phys. J. C 82, 1125 (2022) [arXiv:2209.07765]
7. B. G. Lenardo, **C. A. Hardy** et al., *“Development of a  $^{127}\text{Xe}$  calibration source for nEXO,”* JINST 17, P07028 (2022) [arXiv:2201.04681]
8. G Adhikari [et al., including **C A Hardy**], *“nEXO: Neutrinoless double beta decay search beyond the  $10^{28}$  year half-life sensitivity,”* J. Phys. G: Nucl. Part. Phys. 49, 015104 (2022) [arXiv:2106.16243]
9. D.S. Akerib [et al., including **C.A. Hardy**], *“Projected sensitivities of the LUX-ZEPLIN (LZ) experiment to new physics via low-energy electron recoils,”* Phys. Rev. D 104, 092009 (2021) [arXiv:2102.11740]
10. M. Wagenpfeil [et al., including **C. A. Hardy**], *“Reflectivity of VUV-sensitive Silicon Photomultipliers in Liquid Xenon,”* JINST 16, P08002 (2021) [arXiv:2104.07997]
11. M.G. Aartsen [et al., including **C. Hardy**], *“Velocity independent constraints on spin-dependent DM-nucleon interactions from IceCube and PICO,”* Eur. Phys. J. C 80, 819 (2020) [arXiv:1907.12509]

12. C. Amole [et al., including **C. Hardy**], “Data-Driven Modelling of Electron Recoil Nucleation in PICO C<sub>3</sub>F<sub>8</sub> Bubble Chambers,” Phys. Rev. D 100, 082006 (2019) [arXiv:1905.12522]
13. C. Amole [et al., including **C. Hardy**], “Dark Matter Search Results from the Complete Exposure of the PICO-60 C<sub>3</sub>F<sub>8</sub> Bubble Chamber,” Phys. Rev. D 100, 022001 (2019) [arXiv:1902.04031]