CLARKE A. HARDY

Stanford, CA 94305
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EDUCATION

Stanford University, Stanford, CA
Ph.D., Physics *expected 2025*

Queen's University, Kingston, ON
Master of Science, Physics *Nov. 2019*
Advisor: Tony Noble
Thesis: *The PICO Dark Matter Search: Reflections and Projections*

Bachelor of Applied Science, Engineering Physics (mechanical option) *May 2018*

AWARDS

NSERC Postgraduate Scholarship - Doctoral, NSERC *2020*

Alexander Graham Bell Canada Graduate Scholarship - Doctoral, NSERC (declined) *2020*

Clarendon Scholarship, University of Oxford (declined) *2019*

Berkeley Fellowship for Graduate Study, UC Berkeley (declined) *2019*

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

R. Samuel McLaughlin Fellowship, Queen's University *2018*

NSERC Undergraduate Student Research Award, Queen's University (declined) *2017*

First Place, particle physics category, Canadian Undergraduate Physics Conference *2017*

Ontario Professional Engineers Foundation Scholarship, Queen's University *2015*

Principal's Scholarship, Queen's University *2014*

RESEARCH EXPERIENCE

Graduate Research Assistant, SLAC National Accelerator Laboratory *Sep. 2019 - present*
LUX-ZEPLIN Dark Matter Search
Performed sensitivity study using profile likelihood methods for low energy electron recoils. Assisted with analysis software development.

Graduate Research Assistant, Queen's University/SNOLAB *May 2017 - Aug. 2019*
PICO Dark Matter Search
Designed PICO-40L retroreflector using ray tracing simulations and laboratory tests of materials. Assisted with commissioning detector in underground lab. Determined detector discovery potential in context of neutrino backgrounds.

Undergraduate Research Assistant, Queen's University *May - Aug. 2016*
NEWS-G Dark Matter Search
Performed calibrations and preliminary analysis using Python and PyROOT Operated and maintained 15cm test chamber. Installed new 30cm test chamber. Designed electronics and software to automate pressure readout.

TEACHING EXPERIENCE

Physics 25 Teaching Assistant, Stanford University *Spring 2020*
Modern Physics course for non-physics majors.

Physics 23 Teaching Assistant, Stanford University *Winter 2020*
Electricity, Magnetism & Optics course for non-physics majors.

APSC 111 Teaching Assistant, Queen's University *Fall 2018*
Mechanics course for first year engineering students.

SKILLS

Computing Skills

- Languages: C, C++, ROOT, Python, MATLAB, LabVIEW, Arduino, LaTeX
- CAD: SolidWorks, Solid Edge
- Other tools: MCNP, OrCAD, Git, SVN, Microsoft Office

Laboratory Skills

- Hardware: assembling pressure/vacuum systems, leak checking, ultrasonic cleaning, metalworking, operating standard machine shop equipment.
- Electronics: designing and simulating analog and digital circuits, operating standard laboratory equipment, soldering.

CONFERENCE PRESENTATIONS

"New Outreach Initiatives in Canada with the McDonald Institute" *Jul. 2019*
European Physical Society High Energy Physics Conference (EPS-HEP), Ghent, Belgium

"Searching for Dark Matter with PICO-40L *Jul. 2019*
European Physical Society High Energy Physics Conference (EPS-HEP), Ghent, Belgium

"Determining the Physics Reach of the PICO Bubble Chamber Dark Matter Detectors" *Jun. 2019*
Canadian Association of Physicists (CAP) Congress, Burnaby, BC

"Improving the Optics of the PICO Bubble Chamber Dark Matter Detector" *Jan. 2018*
Winter Nuclear & Particle Physics Conference, Mont Tremblant, QC

"Improving the Optics and Fiducial Volume of the PICO-40L Dark Matter Detector" *Oct. 2017*
Canadian Undergraduate Physics Conference, Ottawa, ON

PUBLICATIONS

1. C. Amole *et al.* (including **C. Hardy**) "Measurements and Models of the Efficiency of Bubble Nucleation by Nuclear Recoils in Superheated Liquids" (2020) (in preparation)
2. M. G. Aartsen *et al.* (including **C. Hardy**), "Velocity independent constraints on spin-dependent DM-nucleon interactions from IceCube and PICO." (2019) (submitted to EPJ-C) [arXiv: 1907.12509]
3. C. Amole *et al.* (including **C. Hardy**), "Data-Driven Modelling of Electron Recoil Nucleation in PICO C3F8 Bubble Chambers", Phys. Rev. D 100, 082006 (2019) [arXiv: 1905.12522]
4. C. Amole *et al.* (including **C. Hardy**), "Dark Matter Search Results from the Complete Exposure of the PICO-60 C_3F_8 Bubble Chamber", Phys. Rev. D 100, 022001 (2019) [arXiv:1902.04031]