

DIANA PRADO LOPES AUDE CRAIK

+41 · 44 633 66 45 ◊ deraik@phys.ethz.ch

HPF E17, ETH Zürich, Otto-Stern-Weg 1, 8093 Zürich, Switzerland

EDUCATION AND EMPLOYMENT

ETH Zürich

SNSF Professor of Physics

Zürich, Switzerland

March 2025 – Now

- Principal investigator leading research group using quantum control to investigate fundamental physics.

ETH Zürich

Lecturer, Postdoctoral Research Assistant, Marie Curie Fellow (until 2023)

Zürich, Switzerland

July 2022 – March 2025

- Precision measurement with trapped calcium ions.
- Prof. Jonathan Home's Trapped Ion Quantum Information research group.

Massachusetts Institute of Technology, Center for Ultracold Atoms

Global Marie Skłodowska-Curie (MSCA) Fellow

Cambridge, MA, USA

September 2019 – July 2022

- Precision measurements of isotope shifts in trapped ytterbium ions to probe for dark matter
- Prof. Vladan Vuletić's research group.

Harvard University

Postdoctoral Fellow

Cambridge, MA, USA

October 2017 - August 2019

- Research on NV-diamond magnetometry and silicon-vacancy qubits
- Walsworth and Hu groups

University of Oxford

Doctor of Philosophy in Atomic and Laser Physics

Oxford, UK

2011 – 2016

Postdoctoral Research Associate

2017

- Ion Trap Quantum Computing group; supervisors: Prof. Andrew Steane and Prof. David Lucas
- Thesis title: Near-field microwave addressing of trapped-ion qubits for scalable quantum computation
- College: Christ Church

Massachusetts Institute of Technology (MIT)

Bachelor of Science in Physics

Cambridge, MA, USA

2006 – 2010

- Ranked in the top quartile (25%) of graduating class (MIT does not provide rankings beyond quartiles)
- Senior thesis: Modelling superconductors using surface impedance techniques; supervisor: Prof. Karl Berggren

University of Cambridge, Trinity College

Cambridge-MIT Exchange Program student - Part II (3rd year) Physics

Cambridge, UK

2008 – 2009

PUBLICATIONS

Nonlinear calcium King plot constrains new bosons and nuclear properties

A. Wilzewski*, L. J. Spieß, M. Wehrheim, S. Chen, S. A. King, P. Micke, M. Filzinger, M. R. Steinell, N. Huntemann, E. Benkler, P. O. Schmidt;

L. I. Huber*, J. Flannery, R. Matt, M. Stadler, R. Oswald, F. Schmid, D. Kienzler, J. Home, D. P. L. Aude Craik;

M. Door*, S. Eliseev, P. Filianin, J. Herkenhoff, K. Kromer, K. Blaum; V. A. Yerokhin, I. A. Valuev, N. S. Oreshkina; C. Lyu, S. Banerjee, C. H. Keitel, Z. Harman; J. C. Berengut; A. Viatkina, J. Gilles, A. Surzhykov; M. K. Rosner, J. R. Crespo López-Urrutia; J. Richter*, A. Mariotti*, E. Fuchs

Submitted to Phys. Rev. Lett. – [arXiv:2201.03578 \[atom-ph\]](https://arxiv.org/abs/2201.03578), 2024

* These authors contributed equally (ETH team is joint main experimental contributor). Note: In this collaboration between several groups, the ETH team's author list is highlighted in bold.

Evidence of Two-Source King Plot Nonlinearity in Spectroscopic Search for New Boson

J. Hur*, D. P. L. Aude Craik*, I. Counts* *et al* [Phys. Rev. Lett. 128, 163201](#) – [arXiv:2201.03578 \[atom-ph\]](#), 2022 – Featured in [Physics](#)

* These authors contributed equally

Nonlinear Isotope Shift in Yb^+ Search for New Boson

I. Counts*, J. Hur*, D. P. L. Aude Craik *et al* [Phys. Rev. Lett. 125, 123002](#) – [arXiv:2004.11383 \[atom-ph\]](#), 2020 – PRL Editor's Suggestion – Featured in [Physics](#), [Scientific American](#), [Phys.org](#), [Physics World](#), [BBC Science Focus](#)

* These authors contributed equally

Microwave-assisted spectroscopy technique for studying charge state in nitrogen-vacancy ensembles in diamond

D. P. L. Aude Craik *et al* [Phys. Rev. Applied 14, 014009](#) – [arXiv:1811.01972 \[cond-mat\]](#), 2020

Quantum diamond spectrometer for nanoscale NMR and ESR spectroscopy

D. B. Bucher, D. P. L. Aude Craik *et al*, [Nature Protocols 14, 2707](#) – [arXiv:1905.11099 \[app-ph\]](#), 2019

High-fidelity spatial and polarization addressing of $^{43}\text{Ca}^+$ qubits using near-field microwave control

D. P. L. Aude Craik *et al*, [Phys. Rev. A 95, 022337](#) – [arXiv:1601.02696 \[quant-ph\]](#), 2017

Hybrid quantum logic and a test of Bell's inequality using two different atomic isotopes

C. J. Ballance *et al.*, [Nature 528, 384](#) – [arXiv:1505.04014 \[quant-ph\]](#), 2015

Microwave control electrodes for scalable, parallel, single-qubit operations in a surface-electrode ion trap

D. P. L. Aude Craik *et al*, [Appl. Phys. B 114, 3–10](#) – [arXiv:1308.2078 \[quant-ph\]](#), 2014

SOFTWARE PACKAGES

qdSpectro A Python package to run spectroscopy experiments on nitrogen vacancy centers in diamond
D. P. L. Aude Craik, DOI: 10.5281/zenodo.1478113 – <https://gitlab.com/dplaudcraik/qdSpectro>, 2019

INVITED TALKS

Scientific Audience

- Key speaker in workshop on “New perspectives in the charge radii determination for light nuclei” to be held at ECT, Trento, Italy in July 2025
- Colloquium at Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig, to be given in May 2025
- Colloquium at the Paul Scherrer Institut, to be given in March 2025
- Cold atoms and molecules for fundamental physics - ICAP satellite conference, Cambridge UK, July 2024
- Atomic and Laser Physics Seminar, Oxford University, UK, April 2024
- AMO Seminar, University of Connecticut, Storrs, CT, USA Feb 2023
- SPIE Photonics West, San Francisco, CA, USA, Jan 2023
- Guest lecturer, course on “Quantum Technologies for Searches of New Physics” , ETH Zürich, Nov 2022
- NACTI 2022 - North American Conference on Trapped Ions, Duke University, NC, USA, Aug 2022
- DAMOP 2022, Topical Group on Precision Measurement & Fundamental Constants Workshop, Orlando, USA, Jun 2022
- Harvard Quantum Initiative Next-Gen Quantum Investigator Colloquium, Harvard University, Feb 2022
- (Declined, unable to attend) SPIE Photonics West, San Francisco, USA, Jan 2022
- MIT PRISM conference, Feb 2021
- Quantum Innovators Workshop, Institute for Quantum Computing, University of Waterloo, Oct 2019
- (Declined, unable to attend) Diamond for Quantum Applications, Royal Society's Theo Murphy Meeting, London, UK, Jun 2019

- Condensed Matter Seminar, Ohio State University, Mar 2019
- Quantum Materials and Devices Seminar, Harvard University, Feb 2019
- IEEE RAPID Conference, Miramar Beach, FL, USA, Aug 2019

General Audience

- [“Ask a Scientist: Quantum Computing”](#), online presentation followed by a question and answer session hosted by the Boston Museum of Science, June 5th, 2020
- [“Trapping Atoms for Quantum Computing”](#), NanoDays with a Quantum Leap, Boston Museum of Science, April 6th, 2019 and again at CIQM Family Open House at the Boston Museum of Science, June 7th, 2019

GRANTS, HONORS AND AWARDS

- Received the Swiss National Science Foundation (SNSF) Starting Grant (1.8 million CHF = US\$2 million) in 2024.
- Received best experimental poster award at the ETH Quantum Center meeting at Schwägalp, 2024
- Awarded the talk prize for talk on “Precision Isotope Shift Measurement in Yb^+ Search for New Boson” at the MIT-Harvard Center for UltraCold Atom’s Retreat, 01/2020.
- Awarded European Union’s Global Marie Skłodowska-Curie Individual Fellowship Grant (€265,840.20 = US\$270k) in the 2016 application round (declined) and 2017 application round (accepted). Grant acronym: PhotonicIons.
- Awarded CIQM Postdoctoral Fellowship at Harvard by the Center for Integrated Quantum Materials (2018-2019).
- Winner of the 2015 EPSRC (Engineering and Sciences Research Council) Science Photography Competition, amongst over 250 entries. National and international press coverage included [Phys.org](#), [BBC Oxford](#), [BBC Brazil](#), [The Guardian](#), [Oxford Mail](#), [The Irish Independent](#), [The Daily Mail](#), [EPSRC news](#), [Oxford University news](#), [NQIT news](#), [O Globo](#)
- Received the 2013 American Friends of Christ Church Graduate Scholarship, University of Oxford
- Received the best experimental poster award at the QuICC Summer School on Quantum Information, Computing and Control 2012, for the poster “Microwave Manipulation of $^{43}\text{Ca}^+$ trapped-ion qubits”

OUTREACH

- Gave a talk at the opening of the “Atome Sehen” (“See Atoms”) exhibit at the Swiss Science Center Technorama. The exhibit is an ion trap that allows visitors to see fluorescence from trapped Barium ions under laser excitation.
- Interviewed for article on our paper on new-boson searches with isotope-shift spectroscopy for the APS [Physics](#) magazine
- Guest scientist in the Boston Museum of Science’s [‘Ask a Scientist: quantum computing’](#), where I answered questions from a live audience online.
- Gave a professionally-filmed talk at the Boston Museum of Science entitled [“Trapping Atoms for Quantum Computing”](#) for the “NanoDays with a Quantum Leap” event in April 2019 (available on the museum’s YouTube channel at <https://www.youtube.com/watch?v=j1SKprQIkyE>). At the same event, invited to be on the expert judging panel for the [Quantum Matters Science Communication Competition](#). Delivered the talk again at a second outreach event at the museum, CIQM Family Open House in June 2019.
- Participated as a speaker at “Science by the Pint” event, the Burren, Somerville, MA, 4th of June, 2018
- Blog aimed at general public on research done during MSCA fellowship: <https://blogs.ethz.ch/iontrapper/>
- Presenter at the [UK National Quantum Technology Showcase](#) 2016 and 2015, London, UK

- Interviewed by BBC radio Oxford about making the ion trap chip that won the EPSRC science photo competition 2015 (<http://www.bbc.co.uk/programmes/p03ls0fy>)
- Interviewed by BBC Brazil for feature entitled “Brazilian wins British Science Photography Competition” (in portuguese). Feature published by [BBC Brazil](#) and covered by mainstream and science-related Brazilian news outlets: [O Globo](#), [Estadão](#), [revista pesquisa FAPESP](#), etc.
- Interviewed in the COST (European Cooperation in Science and Technology) network’s *Ion Traps for Tomorrow’s Applications* video (<https://www.youtube.com/watch?v=zAuDonQFIo4>)

TEACHING AND MENTORING EXPERIENCE

Lecturer, Experimental Techniques in Quantum and Electro-Optics, ETH Zürich Fall 2023,2024
Co-lectured with Daniel Kienzler a new course on Experimental Techniques in Quantum and Electro-Optics to Physics and Quantum Engineering Masters and PhD students. Developed lecture notes for the first half of the course, on control theory, electronics and noise.

Lead Teaching Assistant, Quantum Information Processing I, ETH Zürich Spring 2023
Taught Quantum Information Processing to >100 Masters and PhD students, including giving 25% of the lectures, leading a team of seven teaching assistants and overseeing the preparation of the final exam.

Tutor, Mansfield College, University of Oxford 2014 – 2015
Taught Quantum, Atomic and Molecular Physics (BIII) to third-year physics undergraduates

Tutor, Balliol College, University of Oxford 2012 – 2013
Taught Circuit Theory (CP2) to first-year physics undergraduates

Demonstrator, Undergraduate Physics Laboratories, University of Oxford 2012 – 2013
Demonstrated in first year electronics laboratory

Mentoring/supervision of students 2015 – now
Student project supervision at undergrad level at Oxford, and at grad and undergrad levels at Harvard/MIT.

REVIEWER ACTIVITIES

- Reviewer for Nature, Physical Review A, Physical Review Applied.