

# Hugo V. Lepage

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## Education

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|----------------|--|---------------|
| 2016 – present | <b>University of Cambridge</b><br>Ph.D. Physics - Marie Skłodowska Curie Fellow<br>Developed a GPU-accelerated solver to the time dependent Schrödinger equation for one- and few-particle quantum systems. Applied this code to construct a theoretical framework for quantum optics using electrons. Collaborating with the CNRS in Grenoble, France to fabricate a semiconductor device capable of reproducing optics phenomena using parameters found in my simulations.<br><i>Supervised by Prof. Crispin Barnes.</i> | Cambridge, UK |
| 2013 - 2015    | <b>University of Toronto</b><br>M.A.Sc. Electrical & Computer Engineering  | Toronto, ON   |
| 2010 - 2013    | <b>McGill University</b><br>B.Sc. Honours Physics<br>- Graduated with first class honours  | Montreal, QC  |



## Publications

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|----------------|---|
| 2018 (pending) | H. V. Lepage, A. A. Lasek, D. R. M. Arvidsson-Shukur, and C. H. W. Barnes, <i>Power-of-SWAP operations between single-electron qubits in 2D materials</i> , Nature Communications (submitted).  |
| 2018 (pending) | Shuji Mori, Yousuke Kikuchi, Nobuyuki Hirose, Hugo Lepage, and Willy Wong, <i>Auditory gap detection: psychometric functions and insights into the underlying neural activity</i> , Biological Cybernetics (Submitted BICY-D-18-00033). |
| 2017           | D. R. M. Arvidsson-Shukur, H. V. Lepage, E. T. Owen, T. Ferrus, and C. H. W. Barnes, <i>Protocol for Fermionic Positive-Operator-Valued Measures</i> , Physical Review A.   |
| 2016           | Hugo Lepage, Willy Wong, Markus Bussmann, and Honghi Tran, <i>Acoustic analysis of recovery boiler dissolving tank operation and smelt shattering efficiency</i> , TAPPI Journal.   |
| 2016           | Willy Wong and Hugo Lepage, <i>A peripheral model of gap detection</i> , The Journal of the Acoustical Society of America.  |



## Awards

- 2017 **FRQNT Doctoral Award -- \$ 40,000**  
Fonds de recherche du Québec - Nature et technologies
- 2016 **MSCA Fellow -- € 273,288**  
Marie Skłodowska-Curie Actions  
Horizon 2020 Grant No. 642688
- 2013 **NSERC Stipend -- \$ 3,400**  
Natural Sciences and Engineering Research Council
- 2012 **Edgar & Margaret Wilson Bursary -- \$ 2,000**  
McCall MacBain Scholarships and Student Aid Centre
- 2012 **Mobility Award -- \$ 3,000**  
McGill SESA Office



## Selected Talks

- 2018 *Quantum Optics with Fermions using Surface Acoustic Waves.*  
Towards Ultimate Quantum Theory (UQT), Växjö, Sweden.
- 2018 *Quantum optics with electrons using surface acoustic waves.*  
Deutsche Physikalische Gesellschaft (DPG) Spring Meeting, Berlin, Germany.
- 2017 *GPU-accelerated simulations of SAW-driven single electron transport.*  
Frontiers of Quantum Information Physics (FQIP), Santa Barbara, California, USA.
- 2017 *Describing the time evolution of single electrons.*  
SAWtrain Summer School, Cargèse, Corsica, France.
- 2017 *GPU-accelerated simulations of SAW-driven single electron transport.*  
Foundations of Quantum Mechanics and Technology (FQMT), Växjö, Sweden.
- 2017 *Single electron transport using surface acoustic waves in semiconductor devices.*  
American Physical Society (APS) March Meeting, New Orleans, Louisiana, USA.
- 2016 *Single electron transport using surface acoustic waves in semiconductor devices.*  
Spin Phenomena Interdisciplinary Center (SPICE), Mainz, Germany.
- 2016 *Quantum Media Conversion Between SAW Driven Flying Electron-Spin Qubits and Flying Photon-Polarization Qubits.*  
Asian Quantum Information Symposium (AQIS), Taipei, Taiwan.
- 2016 *Quantum Media Conversion Between Electron-Spin Qubits and Photon-Polarization Qubits.*  
Physics by the Lake, Windsor Great Park, United Kingdom.



## Work Experience

- 2017 - 2018      **Physics examiner**  
University of Cambridge – Cavendish Laboratory  
- Correcting exam scripts for *Advanced Quantum Condensed Matter Physics* and *Quantum Information* master's courses.
- 2016 - 2018      **Undergraduate mathematics teacher for Girton College**  
Girton College, Cambridge  
- Teaching and tutoring Natural Sciences Tripos Maths 1A course.
- 2012 - 2013      **Research Assistant**  
McGill University, supervised by Prof. Michael Hilke  
- Growth of graphene monolayers and band structure analysis via Raman spectroscopy.
- 2012 - 2013      **Teaching Assistant**  
McGill University, for Prof. Johannes Walcher  
- Grading of MATH 249 (Complex Variables)



## Outreach & Social Engagement

- 2017 - 2018      **Co-founder and organiser of the Quantum Journal Club**  
University of Cambridge - Cavendish Laboratory  
- Organise weekly seminars for members of the Physics Department to discuss and debate new discoveries in quantum physics.
- 2017 - 2018      **Invited speaker for Cambridge Immerse programme**  
Cambridge Immerse  
- Invited talks about quantum physics to high-school students.
- 2016 - 2017      **Guest speaker for Cavendish Physics @ Work**  
University of Cambridge - Cavendish Laboratory  
- Scientific outreach for high-school classes.
- 2012              **OSD Note-Taker**  
McGill University - Office for Students with Disabilities  
- Transcribe and upload lecture notes for students with disabilities.
- 2011              **Speaker at *Projet SEUR***  
University of Montreal  
- Give hour lectures on superconductivity to high-school students.  
- Conduct demonstrations using superconductors and liquid nitrogen.



## Skills

Programming: C, C++, C#, CUDA, OpenCL, FORTRAN, Python, Bash  
Operating systems: Linux, MacOS, Windows, High Performance Computing Clusters  
Applications: Visual Studio, Mathematica, MATLAB, ssh, Slurm, L<sup>A</sup>T<sub>E</sub>X  
Languages: English (Native), French (Native), German (Fair)  
Miscellaneous: Strong verbal and written communication skills, excellent problem-solving skills, practiced with the redaction of research papers, good team spirit.