

PROFILE

Dr. LAU Hoi-Kwan (Kero)

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Webpage: <https://scholars.croucher.org.hk/scholars/hoi-kwan-kero-lau>

ACADEMIC POSITION

- Assistant Professor, Department of Physics, Simon Fraser University Since Sep 2020
- Tier II Canada Research Chair in Quantum Information Science
 - Quantum Algorithm Institute Affiliate Fellow
- Postdoc, Pritzker School of Molecular Engineering, University of Chicago Oct 2017 - Aug 2020
- Advisor: Prof. Aashish Clerk
- Visiting Scientist, Max Planck Institute for the Physics of Complex Systems Jan - Sep 2017
- Hosts: Prof. Jan-Michael Rost and Dr. Alexander Eisfeld
- Visitor, University of Toronto Oct - Dec 2016
- Postdoc Fellow, Institute of Theoretical Physics, Ulm University Oct 2014 - Sep 2016
- Advisor: Prof. Martin Plenio
 - Supported by Croucher Postdoctoral Fellowship

EDUCATION

- PhD in Physics, University of Toronto Sep 2009 - Nov 2014
- Thesis title:
 - Supervisors: Profs. Daniel James and Hoi-Kwong Lo
- MPhil in Physics, The Chinese University of Hong Kong Aug 2007 - Aug 2009
- Thesis title:
 - Supervisor: Prof. Pui-Tang Leung
- BSc, The Chinese University of Hong Kong Sep 2004 - Jul 2007
- First class Honour, major in Physics, minor in Mathematics
 - Thesis title:
 - Supervisor: Prof. Pui-Tang Leung

PUBLICATION & PREPRINT

1. Hoi-Kwan Lau, Hong Qiao, Aashish A. Clerk, Tian Zhong, “Efficient in-situ generation of photon-memory entanglement in a nonlinear cavity.”
2. George Watkins, Hoang Minh Nguyen, Varun Seshadri, Keelan Watkins, Steven Pearce, Hoi-Kwan Lau, Alexandru Paler, “A High Performance Compiler for Very Large Scale Surface Code Computations.” (Submitted to)
3. Vincent Dumont, Hoi-Kwan Lau, Aashish A. Clerk, Jack C. Sankey, “Asymmetry-Based Quantum Backaction Suppression in Quadratic Optomechanics.” , 063604 (2022)

20. Hoi-Kwan Lau and Hoi-Kwong Lo, “Insecurity of position-based quantum cryptography protocols against entanglement attacks.” [arXiv:1105.0123](#), 012322 (2011)
21. H. K. Lau, P. T. Leung, L. M. Lin, “Inferring physical parameters of compact stars from their f-mode gravitational wave signals.” [arXiv:1005.1234](#), 1234-1238 (2010)
22. T. C. Chan, K. S. Cheng, T. Harko, H. K. Lau, L. M. Lin, W. M. Suen, X. L. Tian, “Could the compact remnant of SN 1987A be a quark star?” [arXiv:0907.732](#), 732-746 (2009)
23. H. K. Lau and P. T. Leung, “Application of supersymmetric WKB method to cyclic shape invariant potentials.” [arXiv:0807.075](#), 075307 (2008)
24. H. K. Lau and P. T. Leung, “Construction of self-similar shape invariant potentials with the Padé approximation.” [arXiv:0802.025](#), 025206 (2008)

INVITED REVIEW

25. Hoi-Kwan Lau and Aashish A. Clerk, “Perspective: Macroscale entanglement and measurement”, [arXiv:2105.057](#), 570 (2021)

AWARD & HONOUR

Tier II Canada Research Chair in Quantum Information Science	2021 - 2026
Croucher Fellowship for Postdoctoral Research	2014 - 2016
Lachlan Gilchrist Fellowship Fund (University of Toronto)	2013 - 2014
Queen Elizabeth II Graduate Scholarship in Science and Technology (Province of Ontario, Canada)	2013 - 2014
E. F. Burton Fellowship in Physics (University of Toronto)	2012 - 2013
Kwok Sau Po Scholarship (University of Toronto)	2011 - 2012
Outstanding Teaching Assistant Award (Chinese University of Hong Kong)	2008
CMA and Donors Scholarship (Chinese University of Hong Kong)	2007
Dean's Honour List (Chinese University of Hong Kong)	2004 - 2007
Department Scholarship (Shaw College, Chinese University of Hong Kong)	2005
Prof. C. N. Yang's Scholarship (Chinese University of Hong Kong)	2005

CONFERENCE & TALKS

1. "Realizing a perfect quantum transduction by applying a bad transducer twice" [invited talk], 2021 CAP Virtual Congress, Canada, May 2021
2. "In-situ entanglement generation based on rare-earth quantum memory coupled to a nonlinear cavity" [contributed talk], APS March Meeting 2021, U.S.A., Mar 2021
3. "Non-Hermitian quantum sensing: fundamental limits and non-reciprocal advantages" [invited talk], SPIE Photonics West, U.S.A., Mar 2021
4. "What is actually needed to quantum-compute with bosonic systems?" [invited talk], Seminar, Virginia Tech, U.S.A., Feb 2020
5. "Assembling bosonic quantum computers" [invited talk], Seminar, Max Planck Institute for the Science of Light, Erlangen, Germany, Dec 2019
6. "On the dawn of second quantum revolution, what should we care about bosonic quantum computers?" [invited talk], Seminar, National Tsing Hua University, Taiwan, Oct 2020
7. "What is actually needed to quantum-compute with harmonic oscillators?" [invited talk], Seminar, City University of Hong Kong, Hong Kong, June 2020
8. "On the dawn of second quantum revolution: What should we care about quantum computers?" [invited talk], Colloquium, Chinese University of Hong Kong, Hong Kong, May 2020
9. "What is actually needed to quantum-compute with harmonic oscillators?" [invited talk], Seminar,

11. “Fundamental limits and non-reciprocal approaches in non-Hermitian quantum sensing” [contributed talk], APS March Meeting 2019, Boston, U.S.A., March 2019
12. “Universal quantum computing with thermal-state bosonic systems” [contributed talk], APS March Meeting 2019, Boston, U.S.A., March 2019
13. “Applications of optomechanics to quantum sensing and transduction” [invited talk], Midwest Cold Atom Workshop, University of Illinois at Urbana-Champaign, U.S.A., November 2018
14. “What is actually needed to quantum-compute with harmonic oscillators?” [invited talk], Yale Quantum Institute Seminar Series, Yale University, U.S.A., April 2018
15. “Cavity-free quantum optomechanical cooling by atom-modulated radiation” [contributed talk], APS March Meeting, Los Angeles, U.S.A., March 2018
16. “What is actually needed to quantum-compute with harmonic oscillators?” [invited talk], Computer Science Colloquium, Johannes Kepler University, Linz, Austria, May 2017
17. “What is actually needed to quantum-compute with harmonic oscillators?” [invited talk], CQIQC seminar, University of Toronto, Canada, November 2016
18. “Universal Quantum Computing with Arbitrary Continuous-Variable Encoding” [contributed talk], AQIS conference, Taipei, Taiwan, September 2016
19. “Laser cooling of high temperature oscillator by coupling to a multi-level system” [poster], 604. WE-Heraeus-Seminar on “Hybrid Systems for Quantum Optics”, Bad Honnef, Germany, January 2016
20. “Quantum secret sharing with continuous variable cluster states” [contributed talk], APS DAMOP Meeting 2013, Quebec City, Canada, June 2013
21. “Rapid laser-free ion cooling by controlled collision” [contributed talk], APS March Meeting 2013, Baltimore, U.S.A., March 2013
22. “Proposal for ion trap bosonic simulator” [poster], International Conference on Atomic Physics 2012, Palaiseau, France, July 2012
23. “Dephasing of trapped-ion qubit due to Stark shift during shuttling” [poster], 8th Canadian Student Conference on Quantum Information, Sherbrooke, Canada, June 2011
24. “Dephasing of trapped-ion qubit due to Stark shift during shuttling” [poster], Workshop on ion trap technology, Boulder, U.S.A., February 2011
25. “Dephasing of trapped-ion qubit due to Stark shift during shuttling” [poster], 13th annual Southwest Quantum Information and Technology meeting, Boulder, U.S.A., February 2011

COURSES TAUGHT

PHYS 416/816	Introduction to Quantum Information Science	2022 Spring
PHYS 121	Optics, Electricity and Magnetism (w/ P. Haljan)	2022 Spring
PHYS 416/816	Introduction to Quantum Information Science	2021 Spring

OTHER TEACHING EXPERIENCE

Simon Fraser University	Sep 2020-now
- PHYS 125 Mechanics and Special Relativity (guest lecture)	Nov 2021
- CMPT 409 Special Topics in Theoretical Computing Science (guest lecture)	July 2021
- TRIUMF Cornerstone Models of Quantum Computing Summer School (Instructor for Continuous-Variable module)	Aug 2021
- PHYS 201 Physics Undergraduate Seminar (guest lecture)	Apr 2021
University of Chicago	2017 - 2020
- Quantum Dissipation and Quantum Measurement (Graduate course, Teaching assistant)	
University of Toronto	2009 - 2014

INTERVIEW

<https://www.nature.com/articles/d41586-021-01223-4>

<https://gizmodo.com/these-drums-beat-in-perfect-synchrony-because-theyre-qu-1846868881>

REFERENCE

Prof. Aashish A. Clerk (Postdoc advisor)
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