Pramodh Senarath Yapa, PhD

NSERC Postdoctoral Fellow Canadian Citizen

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Education and Research Experience

Uppsala University — Uppsala, Uppsala County, Sweden

NSERC Postdoctoral Fellow — *Nov 2025 – Present*

(Supervised by Prof. Annica Black-Schaffer)

- Investigating theories of unconventional superconductivity.

University of Innsbruck — Innsbruck, Tyrol, Austria

Postdoctoral Researcher — *Nov 2023 – Mar 2025*

Project: *How Solid is a Supersolid?*

(Supervised by Dr. Thomas Bland and Prof. Francesca Ferlaino)

- Investigated the supersolid phases of Bose-Einstein Condensates with long-ranged dipolar interactions.

University of Alberta — Edmonton, AB, Canada

Ph.D. – Theoretical Condensed Matter Physics (GPA : 3.83/4.00) — *Sep 2018 – May 2024*

Thesis: *Unconventional Cooper Pairing and Confinement*

(Co-supervised by Prof. Joseph Maciejko and Prof. Frank Marsiglio)

- Investigated novel quantum phases of superfluid helium-3, and mixed-symmetry superconductivity in the extended Hubbard model; both in the presence of confining boundaries.

University of Victoria — Victoria, BC, Canada

M.Sc. – Theoretical Condensed Matter Physics (CGPA : 8.14 / 9.00) — *Sep 2015 – Dec 2017*

Thesis: *Non-Local Electrodynamics of Superconducting Wires: Implications for Flux Noise and Inductance*

(Supervised by Prof. Rogério de Sousa)

- Investigated the effects of non-local electrodynamics on the properties of superconducting qubits.

Carleton University — Ottawa, ON, Canada

B.Sc. – Honours Theoretical Physics (CGPA : 10.07 / 12.00) — *Sep 2010 – Apr 2015*

Honours Thesis: *Supersymmetry Phenomenology*

(Supervised by Prof. Thomas Gregoire)

- Investigated signatures of supersymmetric particles using simulated LHC collision data.

Simon Fraser University — Burnaby, BC, Canada

NSERC Undergraduate Student Researcher — *May 2015 — Aug 2015*

Supervised by Prof. Karen Kavanagh

- Used electron holography to investigate properties of Manganese Phosphide nanoclusters.

TRIUMF - Canadian Particle Accelerator Centre — Vancouver, BC, Canada

Research Assistant in UltraCold Neutron (UCN) Group — *Jan 2014 — Aug 2014*

Supervised by Prof. Rüdiger Picker

- Supported the development of PENTrack, the UCN experiment's Monte Carlo simulation for UCN physics.

Awards

Postdoctoral

NSERC Canada Postdoctoral Research Award — 2025

C$70,000/year × 2 years: National Level

NSERC Postdoctoral Fellowship (**Declined**) — 2023

C$45,000/year × 2 years: National Level

University of Alberta

Friends of the Faculty of Graduate Studies and Research Scholarship — 2024

C$1,500: University Level

Andrew Stewart Memorial Graduate Prize — 2023

C$5,000: University Level

↪ *Awarded for excellence in research at the doctoral level*

Devendra Jindal Graduate Scholarship — 2022

C$1,600: Faculty Level

↪ *Awarded for superior academic achievement*

Alberta Graduate Excellence Scholarship — 2022 & 2019

C$12,000: Provincial Level

Alberta Innovates Graduate Student Scholarship 2020 – 2022
C$31,000/year × 3 years: Provincial Level
Dr Isaac Yakoub Isaac Graduate Scholarship in Physics 2020
C$1,000: Department Level
↪ *Awarded for academic achievement, demonstrated leadership, and commitment to volunteer work*
Queen Elizabeth II Graduate Scholarship - Doctoral Level 2018
C$7,500: Provincial Level
Doctoral Recruitment Scholarship 2018 2018
C$10,000: University Level

University of Victoria
Charles S. Humphrey Graduate Student Award 2017
C$2,500: University Level
UVic Graduate Award 2015 – 2017
C$4,000/year × 3 years: Department Level

Carleton University
NSERC Undergraduate Student Research Award 2015
C$4,500: University Level
Carleton University Deans' Honour List 2015 & 2011
Carleton University President's Scholarship 2010 – 2012
C$8,000: University Level

Publications

9. **Senarath Yapa, P.**, Maciejko, J., Marsiglio, F., Black-Schaffer, A.M., *A Superconducting Peierls Instability*, arXiv:2609.04164 [cond-mat.supr-con].
8. **Senarath Yapa, P.**, Bland, T. *Anomalous dispersion of shear waves in dipolar supersolids*, Physical Review A **112**, L021303 (2025); arXiv:2410.16060 [cond-mat.quant-gas].
7. **Senarath Yapa, P.**, *Unconventional Cooper Pairing and Confinement: Studies of lattice superconductivity and superfluid helium-3 enclosed by surfaces*, PhD Thesis, University of Alberta Education & Research Archive (2025).
6. **Senarath Yapa, P.**, Guo, X., Maciejko, J., Marsiglio, F. *Mixed-symmetry superconductivity and the energy gap*, Physica C: Superconductivity and its Applications **633**, 1354719 (2025); arXiv:2502.04739 [cond-mat.supr-con].
5. **Senarath Yapa, P.**, Boyack, R., Maciejko, J. *Triangular pair-density wave in confined superfluid ^3He*, Physical Review Letters **128**, 015301 (2022); arXiv:2104.15125 [cond-mat.supr-con].
4. Rudd, M. J., **Senarath Yapa, P.**, Shook, A.J., Maciejko, J., Davis, J. P. *Strong-coupling corrections to hard domain walls in superfluid ^3He-B*, Physical Review B **104**, 094520 (2021); arXiv:2106.02065 [cond-mat.supr-con].
3. Shook, A.J., Vadakumbatt, V., **Senarath Yapa, P.**, Doolin, C., Boyack, R., Kim, P. H., Popowich, G. G., Souris, F., Christani, H., Maciejko, J., Davis, J. P. *Stabilized Pair Density Wave via Nanoscale Confinement of Superfluid ^3He*, Physical Review Letters **124**, 015301 (2020) – **Selected as Editor's Suggestion and reported on by Phys.org**; arXiv:1908.01779 [cond-mat.supr-con].
2. **Senarath Yapa, P.**, Makaro, T., de Sousa, R. *Impact of Nonlocal Electrodynamics on the Flux Noise and Inductance of Superconducting Wires*, Physical Review Applied **11**, 024041 (2019); arXiv:1806.09705 [cond-mat.supr-con].
1. **Senarath Yapa, P.**, *Non-local electrodynamics of superconducting wires: Implications for flux noise and inductance*, MSc. Thesis, University of Victoria Libraries (2017).

Presentations

Academic Oral Presentations

19. "Supersolids: How to make 'em, and how to shake 'em", **Materials Theory Division Seminar**, Uppsala University, Sweden, January 2026.
18. "Of superconductors and supersolids: two short tales of unconventional Cooper pairing" (Invited Talk), **CMP Seminar**, University of Geneva, Switzerland, April 2025.
17. "What type of solid is a dipolar supersolid?" (Invited Talk), **CQD Colloquium**, University of Heidelberg, Germany, December 2024.
16. "How solid is a dipolar supersolid?", **APS DAMOP Meeting 2024**, Fort Worth, TX, USA, June 2024.
15. "How solid is a dipolar supersolid?" (Invited Talk), **CMP Seminar**, University of Alberta, AB, Canada, May 2024.
14. "Supersolidity in Confined Superfluid Helium-3', (Invited Talk), **Ultracold Seminar**, University of Innsbruck, Innsbruck, Austria, November 2023.

13. "Mixed-symmetry Superconductivity in the Extended Hubbard Model" (Invited Talk), **Quanta CREATE Student Symposium 2023**, Edmonton, AB, Canada, August 2023.
12. "Inhomogeneous Superconductivity due to Surfaces", **APS March Meeting 2023**, Las Vegas, NV, USA, March 2023.
11. "Theory of a 2D Spatially-Modulated Phase in Superfluid Helium-3 under Confinement", **Quanta CREATE Student Symposium 2022**, Edmonton, AB, Canada, August 2022.
    ↪ ***Awarded an Honourable Mention in Oral Presentation Competition.***
10. "Triangular Pair-Density Wave in Confined Superfluid 3He", **APS March Meeting 2022**, Chicago, IL, USA, March 2022.
9. "Creating a Superfluid Crystal in Helium-3 " (Invited Talk), **Alberta Section of the American Association of Physics Teachers Workshop** (Online), December 2021.
8. "Triangular Pair-Density-Wave in Confined Superfluid ^{3}He" (Invited Talk), **International Conference on Quantum Fluids and Solids 2021** (Online), August 2021.
7. "Triangular Pair-Density-Wave in Confined Superfluid ^{3}He", 2021 CAP Congress (Online), June 2021.
    ↪ ***Awarded 1st place in CMP Division Oral Presentation Competition.***
    ↪ ***Awarded 2nd place Overall in the Oral Presentation National competition***.
6. "(Near) 2D Helium-3 and Superfluid Crystals", **University of Alberta Graduate Physics Student Association Symposium 2021**, (Online), University of Alberta, AB, Canada, Jan 2021.
    ↪ ***Awarded 3rd place in Oral Presentation Competition.***
5. "Superfluid 3-He: Within the Confines" (Invited Talk), **Quantum Fluids in Isolation Seminar Series**, (Online) Nov 2020.
4. "Superfluid 3-He: Within the Confines", **TRU Virtual Physics Conference 2020**, Online, May 2020.
3. "Impact of Non-Local Electrodynamics on Flux Noise and Inductance of Superconducting Qubits", **APS March Meeting 2018**, Los Angeles, CA, USA, March 2018.
2. "Topological Phase Transitions: The 2016 Nobel Prize in Physics", **UVic Professional Development Workshop for High School Physics Teachers**, Department of Physics and Astronomy, University of Victoria, Victoria BC, February 2017.
1. "PENTrack, Field Folding and the MicroRoughness Model", **UltraCold Neutron (UCN) Collaboration Meeting, TRIUMF**, Vancouver, BC, August 2014

Academic Poster Presentations

11. "A Superconducting Peierls Instability", **Materials and Mechanisms of Superconductivity (M^2S) conference**, Stuttgart, Germany, July 2026.
10. "Peierls and a Pair-density Wave", **Nordic-German Wilhelm and Else Heraeus-Seminar 2026: Quantum Condensates and Quantum Geometry (QCQG)**, Nordita, Stockholm, Sweden, March 2026.
9. "Supersonic shear waves in dipolar supersolids", **3rd quantA Workshop**, Innsbruck, Tyrol, Austria, November 2024.
8. "Shear waves in a two-dimensional dipolar supersolid", **International Conference on Quantum Optics and Quantum Information: IQOQI 20 Years**, Innsbruck, Tyrol, Austria, September 2024.
7. "Triangular Pair Density Wave in Confined Superfluid Helium-3", **Quanta CREATE Student Symposium 2022**, Edmonton, AB, Canada, August 2022.
6. "Triangular Pair Density Wave in Confined Superfluid Helium-3", **Boulder Summer School for Condensed Matter and Material Physics 2022**, July 2022.
5. "Triangular Pair Density Wave in Confined Superfluid Helium-3", **2022 CAP Congress**, June 2022.
4. "Triangular Pair Density Wave in Confined Superfluid Helium-3", **Quantum Days 2022 Conference** (Online), February 2022.
    ↪ ***Awarded an Honourable Mention in Graduate Student Poster Competition.***
3. "Exotic Phases of Confined Helium-3: A Theoretical Study", **International Conference on Quantum Fluids and Solids**, Edmonton, AB, Canada, August 2019.
2. "Exotic Phases of Confined Helium-3: A Theoretical Study", **Quantum Alberta Workshop**, Edmonton, AB, Canada, July 2019.
1. "Determining the Mean Inner Potential of MnP using Electron Holography", **NSERC Summer Student Poster Presentation**, Kavanagh Research Group, Simon Fraser University, Burnaby BC, August 2015.

Outreach

12. "Physics, people, and communication: Introducing the UU PSciComm Incubator", **Teachers' Lunch Seminar**, Department of Physics and Astronomy, Uppsala University, March 2026.
11. "**Collective Phenomena in Ultracold Dipolar Quantum Gases**: Dance Your PhD 2025 Physics Category Winner", **Science Magazine and the AAAS's Dance Your PhD Competition**, (Assistant Producer and Director of Audio/Video Entry), May 2025.
10. "Discovering Quantum States of Matter", **NcodeX**, (Invited Talk), Online, January 2022.
9. Invited Keynote Speaker, **Sanofi Biogenius Canada High School Science Competition**, April 2021.

8. Invited Speaker on Physics as an Academic Career for High School Students, **Find Your STEM Career**, Morrin Centre, March 2021.
7. "Will You Take the Red P-Wave or the Blue P-Wave?", **Science Telephone Podcast**, (Invited Podcast Guest), Online, Nov 2020.
6. "**Just a Physics Conversation!**: EQUS Quantum Art Award - 2nd Place", **ARC Centre of Excellence for Engineered Quantum Systems' Quantum Art Competition**, (Audio/Video Entry), Sep 2020.
5. "Do Birds Understand Fluid Mechanics?", **NerdNite Victoria**, (Invited Talk), Victoria Events Centre, Victoria, BC, Oct 2020.
4. "Quantum Stuff Swirls for Days", **Nerdin' About Podcast**, (Invited Podcast Guest), Online, Aug 2020.
3. "History of Quantum Mechanics", **Science Literacy Week, St. Albert Public Library**, (Invited Talk), Edmonton, AB, Sep 2019.
2. "**Superconductivity: The Musical!**: Dance Your PhD 2018 Winner", **Science Magazine and the AAAS's Dance Your PhD Competition**, (Audio/Video Entry), Feb 2019.
1. "Fundamental Physics as a Torchlight to the Unknown", **TedxCarletonU**, (Invited Talk), Carleton University, Ottawa, ON, April 2015.

Teaching Experience

University of Alberta — Edmonton, AB, Canada

Teaching Assistant (TA) for Undergraduate Physics Courses — *Fall 2018 - Winter 2019*

- Taught 1st year laboratory course and worked in the Physics Tutorial Center

University of Victoria — Victoria, BC, Canada

Teaching Assistant (TA) for Undergraduate Physics Courses — *Fall 2015 - Winter 2017*

- Graded assignments in 4th year Quantum Mechanics course and taught 1st year laboratory courses

Tutor with UVic Learning Assistance Program — *Sep 2016 – Aug 2018*

- Tutored undergraduate students with learning disabilities in Physics and Math.
- Created personalized lesson plans and learning strategies tailored to each student.

Professional Activities

6. Selected to attend the 8th International Summer School on Computational Quantum Materials, Jouvence, Orford, Québec, Canada, May-June 2026.
5. Referee for Physical Review Letters, Physical Review A, and Journal of Low Temperature Physics.
4. Invited panelist on "Science Communication" at the Canadian Association of Physicists (CAP) Congress 2022.
3. Selected to attend the 2022 Boulder Summer School for Condensed Matter and Material Physics.
2. Selected to attend the Perimeter Institute Online School on Ultra Quantum Matter, August 2020.
1. Lead Organizer (alongside Prof. Mark Paetkau) of the TRU Virtual Physics Conference 2020; an international, multidisciplinary online Physics conference, with 11 Plenary speakers + 28 Graduate Students from across North America and Europe, May 2020.

Leadership and Outreach Activities

Ångström Science Communication and Outreach (ÅSCO) — Uppsala University

Co-founder and Chairperson — *March 2026 - Present*

- Co-founded ÅSCO, an informal community in the Uppsala University Department of Physics, focused on physics and science communication. ÅSCO provides a creative, low-stakes space for experimenting with how we explain physics: from teaching and presentations, to outreach, public engagement, and scientific communication within research areas.
- Brought ScientiFika – an event started at the Nordic Institute for Theoretical Physics (Nordita) and Stockhold University featuring informal and interactive talks followed by delicious Swedish pastries – to Uppsala University.

Graduate Physics Student Association (GPSA) — University of Alberta

President — *Nov 2019 - Nov 2021*

Vice President Academic — *Dec 2018 - Nov 2019*

- Developed Graduate Student Mentorship Program to pair incoming and current graduate Physics students.
- Primary organizer for the Graduate Physics Symposium, an annual graduate research showcase and Public Lecture involving over 100 researchers and 300 members of the public.

Science Graduate Student Association Council (SGSAC)
University of Alberta
Executive Secretary and Department Representative
Nov 2018 - Dec 2021

- Initiated meetings with the Dean of Science and Associate Deans of Graduate studies and EDI regarding supervision policy. This has led to new policies and committees being formed within the Faculty of Science.
- Organized social events for graduate students in different Departments within the Faculty of Science to socialize.

Equity, Diversity and Inclusion Committees
University of Alberta
Graduate Student Representative
Sep 2020 - Dec 2021

- Representative on EDI committees at the Faculty of Science and the Department of Physics levels, as well as on the leadership team of the UAlberta Physicists for Justice + Equity + Diversity + Inclusion group.
- Helped develop policy for creating an equitable environment within the Faculty of Science and Department of Physics, and creating resources for EDI efforts.
- Organized talks and events to highlight EDI issues and promote marginalized groups in Science, such as Wikipedia-Edit-A-Thons to create Wikipedia articles for Canadian Physicists from marginalized communities.

ComSciConCAN Science Communication Workshops
Lead Organizer and Advisory Board Member
Oct 2019 - Aug 2023

- Organizer of a 3-day Science Communication Conference for Canadian STEM graduate students, held virtually, July 2020, and lead organizer for the Western Canadian chapter conference held in November.
- Fundraised C$9,000 from Western Canadian Universities; organized multiple workshops on Science Storytelling, Canadian Outreach and Equitable Science Communication.

Royal Canadian Institute of Science Instagram Takeover
Science Communicator
August 2020

- Taught concepts in Condensed Matter Physics to the general public via a takeover of the RCIScience Instagram account.

Pint of Science Edmonton
Organizer
May 2020 - May 2021

- Helped organize and was a host for Pint of Science Canada 2020, a virtual Science Public Outreach event, with multiple professors from the University of Alberta.
- Organized and moderated a panel on Quantum Technology for the Pint of Science 2021 virtual event.

EQUS Quantum Art Award - 2nd Place
Sep 2020

- Created a hip-hop song about low-temperature physics and plasma physics along with another University of Alberta Graduate Student.
- Chosen as the runner-up by ARC Centre of Excellence for Engineered Quantum Systems at their Quantum Art competition.

Dance Your PhD 2018 Winner
Feb 2019

- Created a 10 minute mini-musical depicting low-temperature physics through the medium of swing dancing, seen by over 100,000 people.
- Chosen as the overall winner by Science Magazine and the American Association for the Advancement of Science from over 50 entries in a global competition.

Physics & Astronomy Graduate Student Society (PAGSA)
University of Victoria
Academic Chair
Sep 2016 - Apr 2018

- Organized monthly graduate student seminar series, career development workshops and developed Graduate Student Mentorship program.

Carleton University Physics Society (CUPS)
Carleton University
Chief Administrator
Sep 2014 - Apr 2015

- Organized seminar series featuring department researchers and a field trip to the SNOLAB research laboratory.

Let's Talk Science National Science Outreach Organization
Graduate Volunteer
Sep 2014 - Aug 2017

- Developed and delivered particle physics workshop to over 200 middle and high-school students.
- Judged Science Olympics event with middle-school students from multiple schools on Vancouver Island.