

# Benjamin Scully

 Benjamin Scully |  b.scully@mail.utoronto.ca |  250-368-7850

## EDUCATION

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### University of British Columbia

2020 - 2025

BSc - Combined Honours in Physics and Astronomy

with Distinction; Co-operative Education Program

## PUBLICATIONS

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1. **Scully, B.**, Matzner, C. D., & Yalinewich, A., Observability of flashes from ejecta crashes in aspherical supernovae, with application to SN 2008D. *MNRAS*.  
[doi.org/10.1093/mnras/stad2360](https://doi.org/10.1093/mnras/stad2360) arXiv: [2307.15859](https://arxiv.org/abs/2307.15859) (Aug. 2023).
2. Sekatchev, M., Liang, X., Majidi, F., **Scully, B.**, Waerbeke, L. V., & Zhitnitsky, A., The Glow of Axion Quark Nugget Dark Matter: (III) the Mysteries of the Milky Way UV Background. *Submitted to JCAP* arXiv: [2504.15382](https://arxiv.org/abs/2504.15382) (Apr. 2025)
3. Soni, S., et al. incl. **Scully, B.** LIGO Detector Characterization in the first half of the fourth Observing run. *Submitted to CQG* arXiv: [2409.02831](https://arxiv.org/abs/2409.02831) (Sep. 2024)

## RESEARCH EXPERIENCE

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### Undergraduate Honours Thesis - *UBC*

Sep 2024 - Present

Supervised by Dr. Ludovic Van Waerbeke & Dr. Ariel Zhitnitsky

- Modelling Axion Quark Nugget dark matter model emission spectrum in JWST and Euclid bands to test observation potential
- Bridging technical details of modern telescopes with theoretical modelling in Python to compare predictions to real-world capabilities
- Will communicate work multiple times in oral and written media by the project conclusion in May 2025

### Undergraduate Research Assistant - *TRIUMF*

May - Aug 2024

Supervised by Dr. Jason Holt

- Used nuclear theory to probe physics beyond the standard model in the field of quark mixing
- Implemented a new quantum operator in the group-wide code base and identified other necessary improvements
- Selected papers and collaborated across theory groups to achieve results

### Undergraduate Research Assistant - *TRIUMF*

Sep 2023 - May 2024

Supervised by Dr. Katherine Pachal

- Prepared and developed fast scintillator detector paddles for the DarkLight experiment
- Improved mechanical design and assembled scintillators, detector architecture, and wiring for the set-up
- Developed and conducted data analysis to achieve sub-200 picosecond time resolution
- Simulated particle interactions to confirm theoretical expectations

### Undergraduate Research Assistant - *LIGO UBC*

May - Aug 2023

Supervised by Dr. Jess McIver

- Studied signal vs glitch classification in LIGO/Virgo detectors to improve gravitational wave detection capabilities

- Developed machine learning, dimensional reduction, and visualization techniques in Python with *KERAS & TensorFlow* to identify gaps in classifier performance
- Worked with large data sets to directly improve identification capabilities of the classifier

## Undergraduate Research Assistant - *University of Toronto*

May - Aug 2022

Supervised by Dr. Christopher D. Matzner

- Studied observability of circumstellar ejecta collisions from aspherical supernovae and compared findings to observed events
- Independently implemented aspherical supernovae in C++ hydrodynamics simulation despite having no prior experience with the language or object oriented design
- Achieved novel conclusions on observables and wrote a paper which was published in MNRAS.

## PRESENTATIONS AND TALKS

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1. **Undergraduate Thesis** Apr 2025  
*Axion Quark Nugget Glow: Observing dark matter in modern telescopes*
2. **CUPC 2024 Undergraduate Talk** Oct 2024  
*Standard Model Mixology: Exploring Quark Mixing Through Nuclear Theory*
3. **TRIUMF Science Week “Science Pitch” (Honourable Mention)** Jul 2024  
*Up is Down: Ab-Initio Approaches to Superallowed Beta Decay to Test for New Physics*
4. **UBC Summer-student Astronomy Colloquium** Aug 2023  
*Semi-supervised clustering of LIGO-Virgo signals to improve GSPyNetTree classification*

## POSTERS

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1. **TRIUMF Co-op Poster Presentations** Aug 2024  
*Standard Model Mixology: Exploring Quark Mixing Through Nuclear Theory*
2. **TRIUMF Co-op Poster Presentations** Apr 2024  
*DarkLight Fast Scintillator Trigger Detector Development*
3. **UofT Dunlap SURP Poster Presentation (Honourable Mention)** Aug 2022  
*Do circumstellar collisions make observable transients in aspherical supernovae?*

## AWARDS AND GRANTS

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- Paul Sykes Scholarship in Astronomy** – (\$1 200) Dec 2024
- Scholarship made on the recommendation of the Department of Physics and Astronomy
- Dante Ciccone Memorial Scholarship in Astronomy** – (\$1 575) Sep 2024
- Scholarships totaling \$3,150 for graduate or undergraduate students studying astronomy
- Dean of Science Scholarship** – (\$280) Sep 2024
- Recognizes UBC students for service to faculty and fellow students
- Canadian Institute for Nuclear Physics URS** – (\$11 500) May 2024
- Funded my work at TRIUMF with Dr. Jason Holt
- NSERC USRA** – (\$11 000) May 2023
- Funded my work on LIGO/Virgo at UBC with Dr. Jess McIver
- Charles and Jane Banks Scholarship** – (\$270) Sep 2022
- Awarded on the recommendation of the Faculty to worthy and deserving students
- NSERC USRA** – (\$9 690) May 2022
- Funded my work at UofT with Dr. Christopher Matzner

- Awarded to students with an average of  $\geq 90\%$  the previous Winter Session

## OUTREACH AND SERVICE

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### UBC PHAS EDI Committee

*May 2024 - May 2025*

- Member of the UBC Physics Department's Equity Diversity and Inclusion committee with the goal of providing guidance on policy changes, and inspiring new initiatives
- My responsibilities center around establishing professional development and effective resources for members of the community

### Girl Guide Physics Activities

*Jan 2024 - Apr 2025*

- Taught interactive physics activities to Girl Guide groups of ages 5-12.
- Activities included LED circuits, spaghetti towers, and instruction about general relativity

### UBC Physics Olympics

*Mar 2023 - Mar 2025*

- Physics and astronomy competition for high-school students
- Formulated rules, designed and ran pre-build competition in 2024 and currently for 2025
- Ran vacuum pump pre-build competition and Quizzics (Physics Quiz) competition in 2023

### UBC Canadian Undergraduate Physics Conference Organizer

*Jan - Oct 2024*

- Acted as external coordinator in the organization of CUPC at UBC for the Fall of 2024.
- Handled all aspects of securement, and organization of all nineteen keynote and panellist speakers
- Additionally managed catering and sponsorship details, and judged student presentations

### UBC Faraday show

*Nov 2023*

- Annual science lecture to introduce Physics to younger generations
- Presented to over 300 members of the public

## SKILLS

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**Programming:** Python (TensorFlow, Astropy), C++, ROOT, Java, Matlab

**Applications:** GitHub, Linux terminal, LaTeX, MadGraph, SolidWorks, Microsoft Office

**Other:** Object oriented design, Data collection & analysis, Computing clusters, Scientific writing, Delicate materials handling, Physical construction/assembly

**Attributes:** Detail oriented, Communication, Public speaking, Teamwork, Empathy

## WORKSHOPS AND SPECIAL PROGRAMS

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### Canadian Astroparticle Physics Summer School (CAPSS)

*May 2023*

*Week long summer program at Queens University and SNOLAB*

### French Immersion Dual Dogwood highschool diploma

*Jun 2020*

*Double degree acknowledging achieved French fluency through Late French Immersion*

## NON-ACADEMIC WORK EXPERIENCE

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**Lifeguard & Swim Instructor** – City of Rossland

*2019 - 2021*

**Meat shop Cleaner and Cashier** – Ferraro Foods

*2017 - 2019*

## LANGUAGES

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**Fluent:** English, French – **Learning:** Spanish (B1), German (A1)