

# WILLIAM WOODLEY

Edmonton, AB [REDACTED]

[REDACTED] · [wwoodley@ualberta.ca](mailto:wwoodley@ualberta.ca)

<https://wwoodley.com>

## Education

---

- 2018 – 2023 Ph.D. in Physics  
University of Alberta  
Supervisor: Prof. Marie-Cécile Piro  
Thesis: *MUTE: A Program for High-Precision Calculations of Underground and Underwater Muon Intensities*
- 2015 – 2018 B.Sc. Physics (Hons) with Minor in Mathematics  
University of New Brunswick  
Supervisors: Profs. Mohammad Ahmady, Ruben Sandapen, Abdelhaq Hamza  
Thesis: *Predicting Diffractive  $\rho$  and  $\phi$  Production using Light-Front Holographic Wavefunctions*
- 2013 – 2015 Diploma of Higher Education in Theoretical Physics  
University of Edinburgh

## Publications

---

4. **Woodley, W.**, Fedynitch, A., Piro, M.-C. (2023). Challenges and Opportunities for Predicting Muons in Underground and Underwater Labs Using MUTE. *PoS, ICRC2023*. doi:10.22323/1.444.0476
3. Fedynitch, A., **Woodley, W.**, Piro, M.-C. (2022). On the Accuracy of Underground Muon Intensity Calculations. *ApJ*, **928**(27). doi:10.3847/1538-4357/ac5027.
2. **Woodley, W.**, Fedynitch, A., Piro, M.-C. (2021). A Modern High-Precision Calculation of Deep Underground Cosmic Ray Muons. *PoS, ICRC2021*. doi:10.22323/1.395.1226
1. PICO Collaboration (Amole, C., et al.) (2019). Data-Driven Modeling of Electron Recoil Nucleation in PICO C<sub>3</sub>F<sub>8</sub> Bubble Chambers. *Phys. Rev. D*, **100**(8). doi:10.1103/PhysRevD.100.082006

Publications Accepted:

1. **Woodley, W.** (2024). *MUTE: A Program for High-Precision Calculations of Underground and Underwater Muon Intensities*, Ph.D. Thesis. University of Alberta.

Publications in Preparation:

2. **Woodley, W.**, Fedynitch, A., Piro, M.-C., (2024). Precise Calculations of Seasonal Variations in Cosmic Ray Muon Fluxes Underground. In preparation for submission to *Physical Review D*.
1. **Woodley, W.**, Fedynitch, A., Piro, M.-C., (2024). Uncertainties on Cosmic Ray Muons in Laboratories Deep Underground. In preparation for submission to *Physical Review D*.

## Projects

---

### MUTE (MUon inTensity code)

<https://github.com/wjwoodley/mute>

An open-source modular Python program used to calculate atmospheric muon fluxes and intensities underground and underwater taking into account overburden geometry and composition.

---

## Contributed Presentations

---

13. *Challenges and Opportunities for Predicting Muons in Underground and Underwater Labs Using MUTE*  
International Cosmic Ray Conference (ICRC)  
Virtual, Nagoya, Japan (July 2023)
12. *Predicting Muon Fluxes and Seasonal Variations in Underground and Underwater Labs Using MUTE*  
Canadian Association of Physicists (CAP) Congress  
Fredericton, New Brunswick (June 2023)
11. *MUTE: A Modern Calculation of Deep Underground and Underwater Muons*  
Winter Nuclear and Particle Physics Conference (WNPPC)  
Banff, Alberta (February 2023)
10. *MUTE: A Modern Calculation for Deep Underground and Underwater Muons*  
TeV Particle Astrophysics (TeVPA)  
Kingston, Ontario (August 2022)
9. *MUTE: A Modern Calculation for Deep Underground and Underwater Muons*  
Neutrino 2022  
Virtual, Seoul, Korea (May 2022)
8. *MUTE: A Modern Calculation of Deep Underground and Underwater Cosmic Ray Muons*  
Winter Nuclear and Particle Physics Conference (WNPPC)  
Virtual (February 2022)
7. *A Modern High-Precision Calculation of Deep Underground Cosmic Ray Muons*  
International Cosmic Ray Conference (ICRC)  
Virtual, Berlin, Germany (July 2021)
6. *A Modern High-Precision Calculation of Deep Underground Cosmic Ray Muons*  
Canadian Association of Physicists (CAP) Congress  
Virtual (June 2021)
5. *Propagation of Muon Fluxes to Simulate the Expected External Neutron Background in PICO*  
Thompson Rivers University Virtual Physics Conference (TRU VPC)  
Virtual, Kamloops, British Columbia (May 2020)
4. *Propagation of Muons at SNOLAB*  
Winter Nuclear and Particle Physics Conference (WNPPC)  
Banff, Alberta (February 2020)
3. *Expected Neutron Background for the PICO-500 Detector with Geant4 Simulations*  
Canadian Association of Physicists (CAP) Congress  
Burnaby, British Columbia (June 2019)
2. *Predicting Diffractive  $\rho$  and  $\phi$  Production Using Light-Front Holographic Wavefunctions*  
Graduate Physics Students Association (GPSA) Symposium  
Edmonton, Alberta (October 2018)
1. *Predicting Diffractive  $\rho$  and  $\phi$  Production Using Light-Front AdS/QCD Holography*  
Atlantic Undergraduate Physics and Astronomy Conference (AUPAC)  
Fredericton, New Brunswick (February 2018)

---

## Awards and Honours

---

### Funded Awards (Total: \$44 200):

8. Alberta Graduate Excellence Scholarship  
\$12 000 (January 2023)  
Awarded for outstanding academic achievement (provincial).
7. Alberta Graduate Excellence Scholarship  
\$12 000 (November 2021)  
Awarded for outstanding academic achievement (provincial).
6. Marven L. Blakely Scholarship  
\$8500 (September 2017)  
Awarded for academic achievement in mathematics or physics (institutional).
5. Queen Elizabeth II Graduate Scholarship  
\$5400 (September 2018)  
Awarded for high level of achievement (institutional).
4. Joseph A. and Kathleen A. Flanagan Memorial Scholarship  
\$5000 (September 2016)  
Awarded for academic achievement in science or engineering (institutional).
3. Dr. John W. Purdy Memorial Scholarship  
\$1000 (September 2017)  
Awarded for scholastic achievement in physics (institutional).
2. Best Student Oral Presentation Award in CAP Particle Physics Division (PPD)  
\$300 (June 2021)  
Awarded for an outstanding student research paper presentation (national).
1. Second Place in Experimental Physics Presentations at WNPPC 2023  
\$200 (February 2023)  
Awarded for outstanding student oral presentation (national).

### Other Honours:

3. Honourable Mention in the 2021 Canadian Association of Physicists Best Student Oral Presentation Competition (national)
2. Graduated with First-Class Honours from the University of New Brunswick
1. On the Dean's List at the University of New Brunswick (2015 – 2018)

## Teaching

---

First-year laboratory teaching assistant positions at the University of Alberta:

2022 – 2023    PHYS 146: Fluids and Waves (20 students)

2021 – 2022    PHYS 144: Newtonian Mechanics and Relativity (7 students)  
                  PHYS 126: Fluids, Fields, and Radiation (45 students)

2020 – 2021    PHYS 144: Newtonian Mechanics and Relativity (30 students)  
                  PHYS 146: Fluids and Waves (28 students)

2019 – 2020    PHYS 130: Wave Motion, Optics, and Sound (95 students)  
                  EN PH 131: Mechanics (47 students)  
                  Lead TA for EN PH 131 (supporting other TAs, developing marking guides, administrative assistance)

2018 – 2019    PHYS 130: Wave Motion, Optics, and Sound (109 students)

## Service and Other Activities

---

2017 – 2018    President  
                  Physics and Astronomy Club, University of New Brunswick

                  Primary Event Organiser and Treasurer  
                  2018 Atlantic Undergraduate Physics and Astronomy Conference (AUPAC)

2016 – 2017    Secretary  
                  Physics and Astronomy Club, University of New Brunswick

## Programming Languages

---

Python, R, Java, MATLAB, Maple, Fortran, C++, LaTeX, Git, HTML, CSS

## Spoken Languages

---

English    Native  
French    C1 (Advanced)  
Japanese B1 (Intermediate)  
Irish      A1 (Beginner)