

GRACE CHAMPAGNE

Montreal, Canada

+1 (705) 985-1613 ✉ gracechampagne27@icloud.com  [gracechampagne](https://www.linkedin.com/in/gracechampagne)

EDUCATION

Bachelors of Science, Honours Physics

McGill University - CGPA - 3.79

September 2022 – Present

Montreal, Canada

High School Diploma

Innisdale Secondary School

September 2018 – June 2022

Barrie, Canada

AWARDS

- **DAAD RISE Germany Scholarship** — Awarded by the German Academic Exchange Service (DAAD) to support a research internship in Germany through the RISE Germany program (Summer 2025).
- **Student Undergraduate Research Award (SURA)** — Received competitive funding to conduct independent research at McGill University (Summer 2024).
- **4th Place** — Canadian Astroparticle Physics Summer Student Talk Competition (CASST) (Summer 2024).
- **Honourable Mention** — Trottier Space Institute (TSI) Summer Talk Competition (Summer 2024).

TECHNICAL SKILLS

- | | | |
|--|--|---------------------------------------|
| • Python (modular design, DAQ integration, simulation) | (KiCad, CNC) | Spyder, JupyterLab) |
| • Raspberry Pi hardware interfacing | • 3D design (Fusion 360, SolidWorks) | • Magnetic Resonance Spectroscopy |
| • GUI development (Tkinter) | • Data visualization (Matplotlib, NumPy) | • Chemical phantom preparation |
| • PCB design and fabrication | • Developer Tools (VS Code, | • Spectroscopy data analysis (MATLAB) |

PROJECTS

bSSFP Simulation | [Section Biomedical Imaging](#)

May 2025 - Present

- Worked with MATLAB simulation of bSSFP sequence applied to different deuterated metabolites plotted over chemical offset
- Took real data, analysed bSSFP images via Paravision and compared to simulation for D2O, Glucose and Lactate
- Gained skills in sample preparation, and scanning with 7T MRI

Parahydrogen Bubbler | [Section Biomedical Imaging](#)

July 2025

- Designed, optimized and tested simple model for parahydrogen bubbler
- Operated automated bubbling system

Gadolinium Study | [Section Biomedical Imaging](#)

May 2025

- Prepared samples with various concentrations of Gadobutrol and measure T1 and T2 in both 1T and 7T
- Plotted data and fit linear curves, extracting equations for Gd concentration dependance with T1 and T2

Pressure Sensor Box | [Brunner Neutrino Lab](#)

September 2023 - December 2024

- Designed and constructed a system to **monitor, readout and alert lab members to changes in compressed gas and exhaust pressure in the lab**
- Learned skills in **Raspberry Pi programming** and hardware integration for data acquisition as well as **PCB design and electronics enclosure fabrication**.
- Developed a GUI for the DAQ system and real-time data readout.

nEXO Scale Model  | [Brunner Neutrino Lab](#)

June 2024 - August 2024

- Designed, 3D printed, and constructed a 1:100 scale model of the proposed detector for the nEXO Collaboration.
- Designed a transistor circuit to power LEDs through a Raspberry Pi.
- Developed a program to simulate events and display user options for the simulation with a GUI.

Stepper Motor Control Program  | [Brunner Neutrino Lab](#)

June 2024 - August 2024

- **Developed Python-based control software for precision actuators** involving HT17-268 stepper motors and R35i rotary encoders
- Designed and implemented modular code with a three-class architecture (Configuration, Connection and Command Logic, Functions) to enhance system flexibility and maintainability.
- **Improved Python programming skills** with a focus on modular design and hardware control
- Presented the project at CASST and TSI competitions.

Chroma Stave Scanner | Brunner Neutrino Lab

June 2024 - August 2024

- **Designed and implemented a photon scanning function** within the Chroma photon transport simulation to characterize silicon photomultipliers (SiPMs) used in cryogenic detector staves.
- Gained skills in **Python programming for simulation and analysis** and data visualization and analysis using Matplotlib.

LoLX Residual Gas Analysis | Brunner Neutrino Lab

May 2024

- **Analyzed gas composition using data Residual Gas Analyzer** to deduce purity of Xenon gas flowing through a gas handling system.
- Gained knowledge in **Python programming for data processing and analysis** as well as data cleaning and visualization of data trends using Matplotlib.

Advanced Physics Laboratory Projects | McGill University

January – April 2025

- **Compton Scattering:** Measured the energy and intensity of gamma photons scattered from a Cesium-137 source to experimentally verify Compton's formula and determine the electron mass and classical radius using Klein-Nishina theory.
- **Optical Pumping of Rubidium:** Investigated quantum transitions in Rb vapor using polarized light. Measured absorption cross-sections, Landé g-factors, nuclear spins, Zeeman and quadratic Zeeman effects, and observed Rabi oscillations.
- **Hall Effect in Doped Germanium:** Designed and calibrated a magnetic field apparatus to measure Hall voltage, determine carrier type (p-type), and calculate the carrier concentration of a doped Ge sample with uncertainty analysis.

TECHNICAL EXPERIENCE

Medical Physics Research Intern

May 2025 - Present

Section Biomedical Imaging | University of Kiel 

Kiel, Germany

- Conducting experimental research on deuterium metabolic imaging using a 7T MRI system.
- Experience programming MRI sequences and operating MRI hardware.
- Prepared and analyzed chemical phantoms for in vitro magnetic resonance spectroscopy.

Experimental Nuclear Physics Research Student

August 2023 – December 2024

Brunner Neutrino Lab | McGill University 

Montreal, Canada

- Conducted experimental research and development for the nEXO collaboration under the supervision of Prof. Thomas Brunner, focusing on **3D design, programming, and data acquisition systems**.
- Collaborated on multidisciplinary projects involving 3D modeling, photon simulations, and gas analysis.
- Presented findings at group meetings and competitions, contributing to outreach and scientific communication.

TECHNICAL SKILLS

Programming Languages: Python, C

Developer Tools: VS Code, Spyder, JupyterLab, KiCad, Rstudio, MATLAB, GitHub

EXTRACURRICULAR

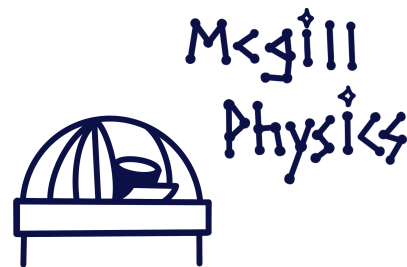
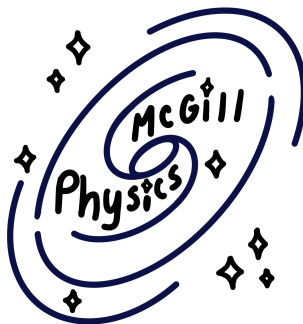
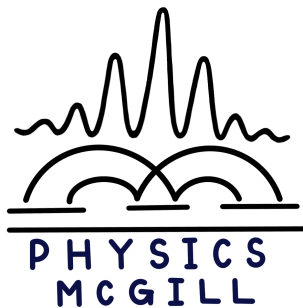
Graphic Designer

May 2023 – May 2025

McGill Science Undergraduate Society 

Montréal, Canada

- **Created digital materials** including logos, posters, brochures, and presentations for **campus clubs, academic societies**, and faculty events.
- Designed the 2024-2025 McGill Student Physics Society Logo.



Frosh Night Events Coordinator

May 2024 – August 2024

McGill Science Undergraduate Society [↗](#)

Montreal

- Led trainings and social events. **Planned all Night events which involved coordinating with venues, writing contracts, and contacting performers.** Led Harm Reduction initiatives. Improved and applied problem solving skills.

First Year Students' Representative

September 2023 – May 2024

McGill Physics Student Society [↗](#)

Montreal

- Worked as a team to organize a school wide fundraising events
- Facilitated connections between students during events, and fostered a safe environment to meet new people

Volunteer Staff

September 2023 – Present

Bar des Arts | McGill Arts Undergraduate Society

Montreal

- Volunteered for weekly social events on campus
- Responsibilities involved setup and cleanup, supervision, restocking, and serving students
- Monitored students' well being both in the bar and waiting outside

Frosh Leader

August 2023

McGill Science Undergraduate Society

Montreal

- Supervised a group of 20 froshies for 4 days of frosh activities
- Planned out of frosh activities (rallies and pre-event meetup spots approved by coords) to make the froshies feel welcomed and excited for the events

Volunteer Staff

August 2023

McGill Engineering Undergraduate Society

Montreal

- Assisted the bar as a barback by restocking, pouring drinks, and organizing stock
- Served and prepared food while maintaining food safety standards

Event Coordinator

February 2022 – June 2022

Relay for Life | Innisdale Secondary School

Montreal

- Was a part of the organising team for a Relay for Life event with over 100 participants raising over \$12 000
- Designed posters, brochures and presentations to advertise the event
- Coordinated fundraising by reaching out to local businesses and communicating with sponsors

ADDITIONAL WORK EXPERIENCE

Server/Busser

July 2022 – September 2023

Menthe et Couscous

Montreal

- Cleaned and set tables, served dishes and answered customer questions

Summer Camp Supervisor

May 2022 – August 2022

City of Barrie

Barrie

- Planned and lead daily programming while supervising day camp leaders

Dance Instructor

November 2021 – May 2022

City of Barrie

Barrie

- Planned and lead dance classes to children ages 3-9
- Organized end of season in-class dance recitals

Cashier/Switchboard Operator/Customer Service

November 2021 – May 2022

Cabelas Canada

Barrie

- Customer service experience both in person and over the phone
- Experience using stock/inventory applications on desktop and POS system

Local Food Ambassador

May 2021

Barrie Hill Farms

Barrie

- Set up and organized food displays
- Supervised fields and operated tractors

INTERESTS

Hiking: Have hiked most of the ski hills around Montréal and plan to one day hike to Machu Picchu

Music: Played the clarinet through secondary school in a concert band. Also played the drums in a jazz band. Planning to start playing jazz clarinet.

Travel: USA, Germany, Italy, Netherlands, Austria, Hungary, Bratislava, Croatia, France