

Colin Dietrich

Master student in Engineering Physics

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Profile

Driven engineering student with dual degrees from École Polytechnique de Bruxelles and Polytechnique Montréal, specializing in quantum physics, photonics, optimization methods, and programming. Eager to apply my diverse skill set to drive innovations in technology

Education

Research MS in Engineering Physics *Polytechnique Montreal* **Montreal, CA** 2022-Present

GPA : 4.0/4.0

Coursework : Quantum Optics, Quantum Information, Ultrafast Photonics, A.I.: methods and algorithms, Quantum Field Theory (McGill University).

Research : Full time dedicated to a supervised research project, consisting in developing a bright source of entangled photons.

MS in Engineering Physics *École Polytechnique de Bruxelles* **Brussels, BE** 2021-Present

Grade : 18.62/20

Coursework : Quantum Mechanics II, Laser Physics, Numerical Methods, Plasma Physics, Digital Electronics, Nuclear Physics.

BS in Engineering Physics *École Polytechnique de Bruxelles* **Brussels, BE** 2018-2021

Honors : Magna Cum Laude

Coursework : Quantum and Statistical Physics, Linear Algebra, Quantum Mechanics I, Semiconductor Physics.

Projects

Nonlinear Materials optimization for Bright Quantum State Generation, **Montreal, CA** 2022 - Present

(Polytechnique Montreal)

Presented at the 7th Montreal Photonics Networking Event : Developed a genetic algorithm for the inverse design of second order nonlinear materials to maximize entangled photon generation via SPDC, advancing quantum technology applications. (Supervisor : Dr. Virally).

Novel Source of Engineered Quantum States of Light, **Montreal, CA** 2022-Present

(Polytechnique Montreal)

Leading a project to experimentally validate theoretical "band conditioned states" detailed in Virally et al. by injecting femtosecond pulses into an SHG crystal, seeding a SPDC process for high-rate entangled photon pairs. Employing balanced homodyne detection on one branch and intensity-based post-selection on its entangled counterpart allows for precise quantum state engineering. (Supervisor : Dr. Virally).

Low-Noise Ultrafast Fiber Laser System, **Montreal, CA** 2023

(Polytechnique Montreal)

Developed an ultrafast, low-noise all-PM Er:fiber laser system operating at 60.9 MHz for quantum optics, achieving high peak power pulses for nonlinear frequency mixing, with a broadband EDFA amplifying pulse energy to 4.2 nJ and enabling controlled spectral broadening to 55 nm (FWHM). (Supervisor : Dr. Virally).

Development Cooperation Project, **Kinshasa, RDC** 2021 - 2022

(CAMESKIN)

Engineered a solar energy monitoring system tailored for the Democratic Republic of Congo's rural regions, programming microcontrollers, developing a Kalman filter for enhanced accuracy, and implementing a MQTT-based remote monitoring app. The system was successfully installed in Kinshasa to monitor solar panels and batteries essential for medical storage.

Solver for two-dimensional Poisson equation,

Brussels, CA 2020

(*École Polytechnique de Bruxelles*)

Developed a C program employing iterative multi-grid methods and preconditioning techniques to efficiently solve 2D Poisson equations, optimizing convergence and computational performance for various membrane shapes.

Video Game Development,

Brussels, BE 2018

Developed and published an arcade game on the App Store using Swift, showcasing innovative gameplay and engaging design.

Skills

- **Programming:** Python, C, C++, Java, Swift, HTML, CSS, Javascript, LaTeX, MATLAB, GNU Octave.
- **Software:** Github, PowerPoint, Excel, word, Adobe PhotoShop, Inkscape, Mathematica.
- **Language:** Native in French, professional skills in Dutch (obtaining the CNaVT, allowing higher education in Dutch) and English.
- **Soft Skills:** Presentation, Planning, Organized, Creative Problem-Solving, Teamwork, Active Listening, Adaptability, Analytical Thinking.

Work And Associative Experience

Laboratory Instructor and Teaching Assistant, (*Polytechnique Montreal*)

Montreal, CA 2023 - present

- Led teams and evaluated initial concept projects in physical engineering (PHS1903), including pulse oximeters, infrared thermometers, wireless energy transfer systems, and laser sensing.
- Served as an evaluator for Statistical Physics (PHS2111) and Biophotonics courses (GBM8802).

Private Tutoring in Mathematics and Sciences,

Brussels-Montreal 2021 - Present

- Self-employed as a private tutor, providing mathematics and science lessons to high school and university students.
- Delivered weekly instruction ranging from 4 to 12 hours, tailoring content to individual learning needs.

Youth Center Management, (*Jeugdhuis 't Uilekot*)

Brussels, BE 2018 - 2022

- Managed a youth center, overseeing daily operations and event coordination.
- Organized various events, enhancing community engagement and youth participation.
- Handled financial management and collaborated on joint projects with the municipality of Uccle and external organizations.

Youth Scout Leader, (*Rosaire*)

Brussels, BE 2018 - 2021

- Coordinated scouting events and educational programs for 8-12-year-olds, fostering teamwork and outdoor skills.
- Led the planning and execution of summer camps.

Tennis Instructor, (*BATD*)

Halle, BE 2016 - 2018

- Provided individual and group tennis lessons to children, teenagers, and adults, totaling 4 to 10 hours weekly at TC Sollenbeemd, Halle, Belgium.
- Conducted all tennis coaching sessions in Dutch, ensuring effective communication and instruction.

Hobbies

- **Running / Trail** : Passionate about running, particularly trail running and outdoor endurance events. Completed several marathons and recently finished my first 80km trail (3500m elevation).
- **Music** : Guitar (10 years of formal training at the Academy of Uccle) and piano.
- **Tennis** : Competitively ranked at C15.2 in Belgium.
- **Backpacking** : Enjoy exploring new places, meeting people, and experiencing different cultures through travel.
- **Physics**
- **Programming**