David Rousso

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A Canadian **particle physics PhD** student on the **ATLAS Experiment at CERN** with a **broad STEM research background,** specializing in **long-lived beyond-standard-model** particle **displaced vertex searches** and **silicon tracker sensors quality control**. I am interested in pursuing a career combining **teaching, research** with an **interdisciplinary** flair, some **hardware** work, and **outreach**.

Academic History and Research Experience

University of Cambridge – PhD Particle Physics – 2019-2023

Gates Cambridge Scholar, ATLAS Collaboration at CERN, Cavendish Laboratory - HEP

DV+MET Analysis: (Analysis Contact)	Searching for long-lived particles using displaced vertex + missing energy signatures. **Analysis contact** (leader). Guiding team in analysis design. Expert in **material maps**.
DV+Jets Analysis: (ATLAS-CONF-2022-054)	Searching for long-lived particles using displaced vertex + jet signatures. Expert in **backgrounds and truth studies**. Responsible for **background characterization and estimation, Higgs-DM portal reinterpretation**. Also work in **limit setting and MC production**. [Paper in approvals]
Qualification Task:	**Designed and developed software framework and reporting tool** technicians across **9 institutes** use for **quality control** (QC) automated decisions and batch reporting for inner tracker upgrade (ITk) **silicon strips sensors** [Proceedings accepted for publication.]
Other:	ATLAS **control room shifts**. ATLAS and CERN **tour guide**. **Started and chair a students-only seminar series** at CERN for UK PhD students

University of Waterloo – BASc Nanotechnology Engineering – 2014-2019 [96.39% GPA]

Combined internship/research program under **Electrical Engineering, Chemical Engineering, and Chemistry departments** with training in circuits, control systems, biochemistry, nanofabrication, numerical methods & multi-physics simulations, material & polymer science, statistical thermodynamics, nanotoxicology, and more.

Paul Scherrer Institute (Swiss ETH Domain): Muon Group – 2018 Particle Physics Trainee	**G4Beamline simulations** for designing setup for **characterizing cold muonium extraction** for **anti-matter gravity** experiment. Also did **quantum Monte Carlo/Bohmian trajectories** and **numerical wave-packet diffraction simulations** for planning interferometry portion of experiment.
Microsoft Japan: Microsoft Office Team – 2017 Program Manager	User experience **(UX) design and testing** for **consumer app. Developed team's workflow** for backlog prioritization and dealing with customer feedback data. Did **development work** with natural language processing **machine learning** for classification and implementing convolutional neural networks for input recognition.
University of Cambridge: Cavendish - AMOP: Hadzibabic Group – 2016 Visiting Student	**Built and designed Raman process optical table setup** with acoustic-optical modulators (AOMs) for rapidly switching **Bose Einstein condensate** (BEC)'s scattering length to investigate weak collapse phenomenon. Did **analytical and numerical simulations** for investigation of the Bloch-Siegart effect.
Harvard University – Wyss Institute: Aizenberg Group – 2016 UG Research Fellow	**Designed and fabricated photonic nanotechnology** for **Harvard Business School-based start-up.** Experience with **hydrogels, colloidal crystals**, **plasmonic** systems, **photonic crystals**, **actuating microfins**, cleanroom **micro- and nano- fabrication**, **metrology characterization techniques**, and **photonic simulations** both natively and in Lumerical FDTD.
Harvard University – SEAS: Capasso Group – 2015 UG Research Assistant	**Designed and optimized ridge waveguide photonic metasurface** structures with Lumerical FDTD and MATLAB for flat multi-chromatic holographic lenses, achromatic flat-lenses, and chiral separating flat-lenses. Improved code base for simulation analysis and exporting devices to fabrication.
University of Waterloo Nano Robotics Group Advisor (2017-2019), Technical Director (2017), Sub-team Lead (2015-2016), Member (2014-2015)	**Directing the undergraduate research group and giving technical guidance to sub-teams designing microbots** for competition. Also work on setup experimentation and **field & microbot microfabrication.**

Peer-Reviewed Articles

- Rousso, D. et al. **Test and extraction methods for the QC parameters of silicon strip sensors for ATLAS upgrade tracker.** *Nuclear Inst. and Methods in Physics Research, A*. [Proceedings accepted for publication, 2022]
- Zhang, S., Kim, M.H., Aieta, F., She, A., Mansuripur, T., Gabay, I., Khorasaninejad, M., Rousso, D., Wang, X., Troccoli, M. and Yu, N., 2016. **High efficiency near diffraction-limited mid-infrared flat lenses based on metasurface reflectarrays**. *Optics express*, 24(16), pp.18024-18034.
- Khorasaninejad, M., Chen, W.T., Zhu, A.Y., Oh, J., Devlin, R.C., Rousso, D. and Capasso, F., 2016. **Multispectral chiral imaging with a metalens**. *Nano letters*, 16(7), pp.4595-4600.
- Khorasaninejad, M., Aieta, F., Kanhaiya, P., Kats, M.A., Genevet, P., Rousso, D. and Capasso, F., 2015. **Achromatic metasurface lens at telecommunication wavelengths**. *Nano letters*, 15(8), pp.5358-5362.

Other Public Results

- ATLAS Collaboration, **Search for long-lived, massive particles in events with displaced vertices and multiple jets in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector.** *CERN*, ATLAS-CONF-2022-054.
- Ritjoho, N., Antognini, A., Crivelli, P., Kirch, K., Taqqu, D., Bartkowiak, M., Papa, A., Knecht, A., Soter, A., Rousso, D., Scheuermann, R., Volder, M., Phillips, T. and Kaplan, D., **The Development of a High Brightness Muonium Beam**. In *Annual Meeting of the Swiss Physical Society*, Lausanne, 2018.
- Zhang, J., Eigen, C., Lopes, R., Garratt, S., Rousso, D., Smith, R.P., Hadzibabic, Z. and Navon, N., 2017, April. **Bloch-Siegert shift in an interacting Bose-Einstein condensate**. In *APS Division of Atomic, Molecular and Optical Physics Meeting Abstracts*.
- Khorasaninejad, M., Chen, W. T., Devlin, R. C., Zhu, A. Y., Oh, J., Rousso, D., & Capasso, F. **Macro to nanoscale imaging using planar lenses at visible wavelengths.** *SPIE Newsroom*, doi, 10(2.1201608), 006633.

Conferences

- **4th World Summit on Exploring the Dark Side of the Universe - EDSU2022**
  Search for Long-Lived particles in ATLAS with Displaced Vertex Signatures in Multi-Jet-Triggered Events [ECS Talk]
- **2022 International Workshop on Baryon and Lepton Number Violation - BLV2022**
  Long lived particles at LHC (not HNL) [Collaboration talk, presenting results on behalf of the LHC collaborations]
- **15th Pisa Meeting on Advanced Detectors – PM2021 (2022)**
  Test and extraction methods for the QC parameters of silicon strip sensors for ATLAS upgrade tracker [Poster]

[Poster at **ATLAS UK 2022**, **ATLAS Week June 2022**, **LHCC Nov. 2022**. Talk at **ATLAS SUSY Workshop 2022**]

Teaching (as Teaching Assistant/Supervisor)

- Part II (3rd Year Undergrad) **Particle and Nuclear Physics** – Lent 2022
- Part III (Masters) **Particle Physics** – Michaelmas 2020
- Part IB (2nd Year Undergrad) **Maths Methods for Physicists** – Michaelmas 2019

Positions of Responsibility

- **DV+MET Analysis** – Analysis Contact (analysis leader) – 2022-Present
- **CERN LTA Student-Only Seminar Series** – Founder/Organizer/Chair – 2022-Present
- **University of Waterloo Nano Robotics Group** – Advisor, Technical Director – 2017-2019
- **University of Waterloo Design Nanoscale Assembly Team (BIOMOD)** – Technical Director – 2015
- **Churchill College Boat Club, City of Cambridge Rowing Club** – Cox – 2020-2021, 2021
- **Gates Scholars Council** – Technology Officer - 2020

Volunteering and Outreach

- **Congrès des Deux Infinis (Outreach with high school students in La Réunion)** – Presenter – 2022
- **Hong Kong Academy for Gifted Education** – Mentor – 2021-Present
- **Tel Aviv University Future Scientists CERN Program** – Speaker, Tour Guide – 2022
- **CERN Visits Service/ATLAS Secretariat** – Tour Guide [also for visits of officials] – 2021-Present
- **CERN International Physics Masterclass** – Moderator – 2022
- **Beamline for Schools** –First Round Evaluator – 2022
- **Gates Teach-a-Thon** – Teacher – 2021, 2022
- **Intel ISEF** – Volunteer, Interpreter [Team France], Extra Chaperone [Team Hong Kong] – 2019
- **Hong Kong New Gen. Cultural Assc. Science Innovation Centre** – Volunteer, Mock Judge – 2017

Selected Awards

- **Gates Cambridge Scholarship** - 2019
- **Governor General's Academic Medal** [Highest average/standing within a Canadian university] – 2019
- **Sandford Fleming Foundation Academic Achievement Award** – 2019
- **Ontario Professional Engineers Foundation Undergraduate Scholarship** – 2018
- **University of Waterloo 50th Anniversary Scholarship** – 2017
- **Churchill College Coxing Prize** - 2021