

Eliot Jane Walton

Third-year PhD student in experimental High Energy Physics

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I am an accomplished experimental particle physicist currently based at Monash University in Melbourne, Australia. My research focuses on measuring the production of double-heavy hadrons, and R&D for the Time of Internally Reflected Cherenkov (TORCH) detector, a next-generation particle identification detector for the Upgrade II of the LHCb experiment. Uniquely for someone of my career level, I am experienced in working with hardware in the laboratory and with LHCb software for analysis.

Higher education

Ongoing - 2022	Monash University and the University of Warwick — PhD in particle physics <i>Charm enhancement in pp-collisions at $\sqrt{s}=13$ TeV and R&D for the TORCH time-of-flight detector</i> (supervised by Prof. Ulrik Egede) My PhD focuses on developing and testing new analysis methods for the contribution by double-parton scattering to the production of the $B_c^\pm$ meson and on data validation and model development for the TORCH detector for LHCb Upgrade II.
2021	Monash University — Bachelor of Science (Honours) <i>Searching for (Anti-)Deuterons using the LHCb Detector</i> (supervised by Prof. Ulrik Egede) My honours research focused on developing, testing and validating a novel data-driven method for identifying (anti-)deuterons with the LHCb detector.

Physics and Software outputs

For my PhD, I spent about 75% of my time on the $B_c^\pm$ production measurement compared to 25% on TORCH.

Production ratio of $B_c^\pm$ meson	I am the lead researcher in the measurement of the production ratio of the $B_c^\pm$ meson to the $B^\pm$ meson as a function of pp-collision multiplicity at $\sqrt{s}=13$ TeV. I am responsible for the major methodological innovations compared to similar measurements, including the development of a new analysis variable, and a new unfolding method.
Photo-electron backscattering in TORCH	I initiated and independently developed a program for calculating the yield of backscattered photo-electrons in the TORCH Microchannel Photo-Multiple Tubes. I was responsible for conceptualising, designing and testing this program.
Data validation for TORCH 2022 Testbeam	I am a member of the TORCH Testbeam analysis team and took particular responsibility for a new data-driven method for determining the external inputs.
Warwick Laboratory Commissioning	I worked as part of a diverse team of technicians, post-docs and junior researchers to commission the TORCH electronics test bench at Warwick University. I was responsible for the laser alignment, single-photon system preparation and temperature monitoring.
Upgrade II Scoping Document	I contributed to the preliminary studies of the RICH-TORCH integration, including of the novel configuration of the TORCH electronics. My work was used to construct figures showing the feasibility of this integration, which is essential for the future of the TORCH project.

Grants, awards and recognition

Early Career Researcher Grant (2025)	I applied for and was awarded an Early Career Researcher Grant to attend the 13th edition of the Large Hadron Collider Physics (LHCP) conference in Taipei Taiwan. I successfully applied to deliver a plenary talk titled <i>Report on diversity and inclusion activities at LHC</i> on behalf of all the LHC experiments.
People's Choice Award Poster (2023)	I presented my poster titled: <i>The Queer History of Physics</i> at the 31st International Conference of Lepton-Photon Interactions which took place in July, 2023. My poster was voted the People's Choice out of approximately 60 other posters.
Theo Murphy Initiative (Australia) (2022)	I partnered with the the Australian non-for-profit organisation QueersInScience to conduct research into the historical contributions of queer Australian scientists. We applied for and were awarded grant funding from the Theo Murphy Initiative (Australia) administered by the Australian Academy of Sciences to conduct this research. I presented the results of this work, the first of its kind, at the Australian Queer History Conference in 2024.

Current positions of responsibility

LHCb Early Career Representative	I was elected to be an LHCb Early Career (EC) representative. In this role I represent 800 early career scientists from 103 institutes in 22 countries. In this role I made significant contributions to the quarterly presentations by the Early Career and Gender Diversity office. I also joined the LHC Early Career Scientist Fora where I took an organisational role in the new Mentoring@CERN program, a merger of the previous Women In Technology and LHC mentoring programs.
LHCb Diversity Committee	I was appointed to be part of the twelve-person committee formed by the LHCb Collaboration Board to study diversity in senior positions and recommend improvements. I learned a great deal about the scope and execution of executive roles in the LHCb experiment. I took the initiative write and edit the individual actions part of the interim report.

Teaching

2025	Monash University — Physics Laboratory Demonstrator I was a laboratory demonstrator for two units, one covering topics in quantum mechanics and thermal physics, the other in atomic and nuclear physics. In each responsible for classes of 18-24 second-year students.
2022-2023	Monash University — Physics & Chemistry Laboratory Demonstrator I was a lead laboratory demonstrator, teaching foundational experimental skills and data analysis to classes of 12-20 second-year students. I also mentored another laboratory demonstrators with less experience.

Supervision

2022	Monash University — Supervising I have co-supervised a second-year research project exploring a novel method for measuring (anti-)deuterons with the LHCb detector.
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Skills

Professional personal skills	I am proficient at networking and interpersonal communication. I am practiced at having difficult conversations with collaborators and team members. I work well within a team. I have taken online courses in "Agile Project Management", "Team Work Foundations" and "Conflict Resolution Foundations".
HEP computing skills	I am proficient in Python and have written programs in C++, Latex, ROOT, DD4HEP and CUDA. In my own time, I have taken courses on the "Fundamentals of Accelerated Computing with CUDA" and "Accelerating CUDA C++ Applications with Multiple GPUs".
Science communication	I am an excellent oral and visual presenter. I am well-practiced at adapting and delivering talks for difference audiences. I am proficient at the design and execution of scientific posters and other visual material. I excel at written communication and am skilled at both scientific and non-scientific writing.
Data analysis skills	I am experienced in using machine learning algorithms, model building, fitting and evaluation and data interpretation. In my own time I have undertaken online courses: "Learning R", "Learning Python" and "Python for Mathematics Visualisation and Machine Learning".

Courses attended

2024	UK Advanced Instrumentation Training The UK advanced Instrumentation Training Programme focuses primarily on the semiconductor theory, simulation, experimental tools and techniques.
2022	Introduction to Statistical Field Theory Coursework consisted of an introduction to statistcial field theory with a particular focus on Mean Field Theory and lattice techniques.
2022	Quantum Field Theory II Coursework consisted of two modules the first focused on renormalisation in the Standard Model; the second on radiation and parton-shower algorithms.

Significant Talks

2024	The Australian Queer History Conference A History of Queerness in STEMM, Victorian Pride Centre, Victoria, Australia. 112th LHCb Week Practical ECGD (with focus on mental health of LHC scientists), Glasgow University, UK. TORCH Collaboration Meeting Testbeam Timing Studies, Bristol, UK (online). Monash-Warwick Alliance of Particle Physics The TORCH Detector: Introduction and Status, Warwick, UK (online). TORCH Collaboration Meeting TORCH Test Beam Update, Oxford, UK.
2022	Queers in Science Symposium Measuring Particle Production with the LHCb detector, Monash, Aus.

Organisation of scientific events and conferences

2024	Particle Physics Masterclass Organising and supporting 60 high-school students with the data analysis tasks assigned in the Masterclass, including giving introductory presentation.
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Outreach, diversity and volunteering

100th LHCb Week Presentation (2021)	Co-presenter for session on "Supporting transgender and non-binary colleagues".
Women in physics and astronomy hall of fame	Co-creator of the Monash University women in physics and astronomy hall of fame, which elevates the profile of historical women scientists.

Publications

I am a named author on 96 publications as a member of the LHCb collaboration as well as short-author publications for the TORCH detector. I am also the lead author of a short-author publication on the history of queer scientists in Australia and an outreach piece for the *CERN Courier*. I expect to be the lead author on the publication from the $B_c^\pm$ production measurement. ORCID:<https://orcid.org/0000-0001-6759-2504>.

2025	<i>Interim report of the Committee on diversity in senior positions at LHCb</i> <i>Internal</i> (forthcoming)
2024	<i>LHCb Upgrade II Scoping Document</i> <i>CERN Document Server</i> https://cds.cern.ch/record/2903094
2024	<i>The TORCH time-of-flight detector for Upgrade II of the LHCb experiment</i> <i>Nuclear Inst. and Methods in Physics Research, A.</i> https://doi.org/10.1016/j.nima.2024.169797
2023	<i>Lepton-Photon Shines Down Under</i> <i>CERN Courier, Nov/Dec.</i> URL: https://cerncourier.com/a/lepton-photon-shines-down-under/
2023	<i>The Queer History of Physics: A First Encounter</i> https://doi.org/10.5281/zenodo.10091193