

Filippo Falezza

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Education

- 2022 – 2026 📖 **Ph.D., University of Birmingham, UK** Nuclear Physics
Thesis title: *On simulating and reconstructing α -induced ${}^9\text{Be}$ neutron sources and their moderation*
- 2018 – 2022 📖 **MSci. Physics, University of Birmingham, UK** 2:1 with Honours

Research Experience


- 2018 – 2022 📖 **Doctoral Researcher, University of Birmingham**
AmBe simulation and characterisation. Designed and validated a full Geant4 simulation of an ${}^{241}\text{Am}$ - ${}^9\text{Be}$ neutron source, modelling the (α, n) reaction, and detector response of HPGe, LiI, and proportional counters against experimental measurements.
Detector simulation, characterisation and analysis of an array of 10 LaBr_3 for γ -ray coincidence measurements, including comprehensive detector response modelling, with two DSSDs telescopes. Implemented MIDAS-to-ROOT data converter and a complete analysis framework in ROOT/C++ for DSSD telescope data, replacing the legacy SunSort analysis framework.
Designed and commissioned digital DAQ system for the MC40 cyclotron at Birmingham. This system interfaces the data acquisitions VME crate composed of four v2745, one v2740, one v1730s, and a VME bridge to the data server infrastructure: two Dell R360 servers with dual 10 GbE network cards configured in a round-robin bond over a 10 GbE switch for full redundancy, each server running a ZFS RAIDZ2 storage pool on SSDs.
Detector electronics design. Designed a charge-sensitive preamplifier and shaping amplifier for PMT readout, for use in a portable isotope identification detector system as part of a supervised bachelor's group project.
Teaching experiments Designed a positronium lifetime measurement experiment (para- and ortho-Ps) as a laboratory exercise; analogue electronics implementation proved challenging in differentiating the positronium states, and the experiment is currently being adapted to use a CAEN digitiser-based approach.
Radioactive beam experiments. Participated in the experimental campaigns of acquisition and online monitoring for ${}^7\text{Be}(d, p){}^8\text{Be}$ reaction at the ISOLDE Solenoidal Spectrometer, CERN, and the ${}^9\text{Li}$ on boron reaction in the TUDA-II chamber at ISAC-II, TRIUMF, including detector operation.

Teaching and Supervision




- 2022 – 2026 📖 **Postgraduate Teaching Assistant** Nuclear Laboratories Teaching Assistant, Department of Physics and Astronomy, The University of Birmingham
Supervised 3rd year nuclear laboratory sessions covering the full range of radiation detection techniques (α , β , γ , x-rays and 1+ detector timing using TAC). Led bachelor project "Development of a Machine Learning Algorithm for Unknown Isotopes Identification" on machine-learning based isotope identification in which students acquire experimental spectra, generate Geant4 training data, design a portable scintillator detector with preamplifier and amplifier electronics, and train the isotope identification algorithm. Supervised all aspects.

Research Publications








Journal Articles

- 1 F. Falezza et al., "Simulation and analysis of an AmBe source," *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 1085, p. 171 233, 2026, ISSN: 0168-9002.  DOI: <https://doi.org/10.1016/j.nima.2025.171233>

Conference Proceedings


- 1 M. Sigmund et al., "Neutron-rich Light-nuclei Studied via Reactions with the ^9Li Beam," vol. 19, 2026, 1–A11.  DOI: [10.5506/APhysPolBSupp.19.1-A11](https://doi.org/10.5506/APhysPolBSupp.19.1-A11)
- 2 K. C. Haverson et al., "Searching for particle-hole cluster bands in ^8Be using the ISOLDE Solenoidal Spectrometer," vol. 311, 2024, p. 00 012.  DOI: [10.1051/epjconf/202431100012](https://doi.org/10.1051/epjconf/202431100012)
- 3 M. Sigmund et al., "Investigating nuclei produced in $^9\text{Li}+^{11}\text{B}$ reaction," vol. 311, 2024, p. 00 026.  DOI: [10.1051/epjconf/202431100026](https://doi.org/10.1051/epjconf/202431100026)

Skills

Computational Nuclear Physics	 Geant4 (detector modelling, binary reaction physics, HPC-parallelised with OpenMPI), ROOT (data analysis, framework development, Daresbury MIDAS conversion) beryllium neutron sources modelling, HPC for nuclear computation
Experimental Nuclear Physics	 Gamma, neutron and charged particle spectroscopy, applied nuclear electronics, HPGe, NaI, LaBr ₃ , plastic scintillators, proportional counters, X-PIPS, gas detectors (Kr, Xe), double sided silicon-strip detectors (DSSDs) reconstruction; SiPM and PMT readout; NIM/VME and CAEN analogue and digital acquisition systems (commissioning and maintenance)
Electronics	 Charge-sensitive preamplifier design, shaping amplifier design, NIM/VME module operation (ORTEC, Canberra, CAEN analogue and digital), TAC-based timing systems, KiCad
Coding	 Python, C++, Fortran, HPC, OpenMPI, NVidia CUDA, \LaTeX , git, ROOT data analysis
General Computing	 Linux (Arch, RHEL), ZFS, server administration, Arduino/AVR architecture, Blender and OpenSCAD, KiCAD
Misc.	 Academic research, laboratory teaching, training, \LaTeX typesetting and publishing, ArchLinux user repository contributor, full clean driving licence (A1/B/BE)
Languages	 English (fluent - degree level), Italian (native), French (basic)

Miscellaneous Experience

Certification

- 2021  **Fundamentals of Accelerated Computing with CUDA C/C++** Awarded by NVIDIA Deep Learning Institute

References

Prof Carl Wheldon - University of Birmingham, UK, c.wheldon@bham.ac.uk
Prof Tzany Kokalova - University of Birmingham, UK & Director of NAPC at IAEA
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Dr Jack Bishop - University of Birmingham, UK, jack.bishop.2@bham.ac.uk
Dr Stuart Pirrie - University of Birmingham, UK, s.h.pirrie.1@bham.ac.uk