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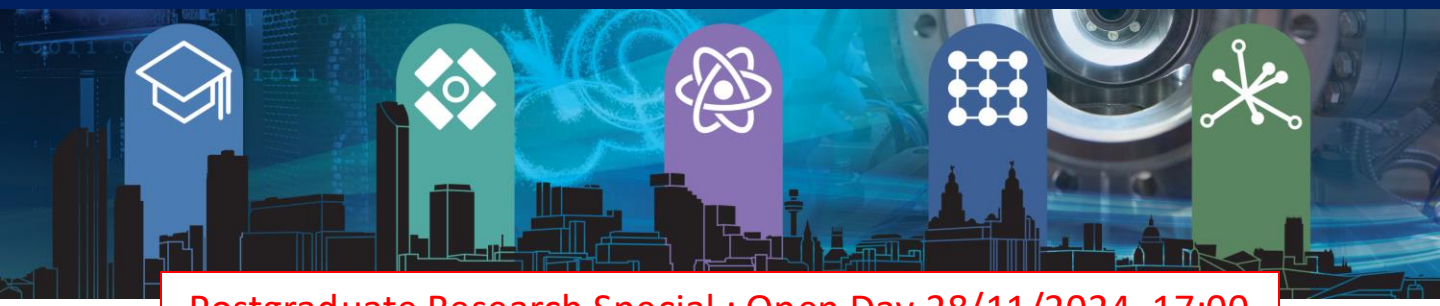
UNIVERSITY OF LIVERPOOL

Department of Physics



Postgraduate Research Special : Open Day 28/11/2024, 17:00

Department of Physics Newsletter

"Welcome to our Postgraduate Opportunities Event! Our department is committed to providing all our students the opportunity to realise their maximum potential as physicists. I hope that you enjoy both the event and reading this special Newsletter. For more information about our Department please visit our website or get in touch with me at any time!"

Prof Tim Veal, *Head of Department*

World-leading Research

Our research is carried out across research clusters, **Accelerator Science**, **Condensed Matter**, **Nuclear Physics**, **Particle Physics,** underpinned by continuous enhancements in **Physics Education** and transversal activities and work on cutting edge technologies in fields such as **artificial intelligence**, renewable energy and **sustainable technologies**, innovative materials, semiconductor and **quantum** sensors, and **medical physics**. Through a programme of **exploration** and **discovery**, we are addressing the most fundamental questions in physics. Our staff contribute to – and often lead – experiments in Liverpool and at international laboratories like CERN, Fermilab, and ESRF. As a PhD student, you will be a crucial part in this work.

The most recent Research Excellence Framework assessment (in 2021) placed us amongst the **UK's top 10 physics departments** for our research outputs and the quality of our research environment.

Prof Monica D'Onofrio, *Head of Research*

Keep up to date with our latest news via X or Instagram.

What it's like being a PhD student

Apply for one *of* **our fully funded PhD positions** to join a research community of more than 100 PhD students!

As a PhD student you will learn how to perform research both independently and as a part of a research group. You may work for large or small international collaborations, and you may have opportunities to take long-term attachments in overseas laboratories like CERN. During year 1, you will attend both subject specific and wider skill training. You will have the chance to attend seminars, go to schools and conferences and participate in undergraduate teaching. Within 4 years, you will have to submit a thesis for examination .

For general inquiries about out PhD programme please contact our Postgraduate Research Director, Dr Nikos Rompotis

Join our Postgraduate Open Day to learn more!

Thursday 28 November 2024, 17:00, Leo Carrol Suite and online

liverpool.ac.uk/physics
@livuniphysics
physics@liverpool.ac.uk

THE ORIGINAL REDBRICK

UNIVERSITY OF LIVERPOOL

Department of Physics

Images courtesy of: Liverpool Semiconductor Detector Centre | ALICE at CERN | XMaS based at ESRF | Department of Physics

PhD applications and funding

To apply for a PhD, it is usually expected that you have a MPhys with a 1st or 2:1 or an MSC.

We have **several fully funded PhD positions**, covering both fees and stipend for usually 3.5 years. Our main funders are STFC and EPSRC. Some of the positions are under specific programmes, like the **Liverpool Centre for Doctoral Training for Innovation for Data Intensive Science** (LIV.INNO). For LIV.INNO positions the funding is 4 years and they also include a 6-month industrial placement during the 4-year period.

LIV.INNO

Our research Clusters

Accelerator Physics

Accelerator physics at Liverpool carries out world-class research with particle accelerators and drives innovation in technologies that help boost the performance of accelerator-based research infrastructures. Our research is realized in close collaboration with our national and international partners, enhanced by the unique facilities at Daresbury Laboratory and the Cockcroft Institute, as well as our collaboration partners from around the world.

Our research activities include:
Antimatter research: investigating fundamental symmetries and interactions.
Frontier accelerators: collaborating with global research groups to design, build, and optimize world-class research infrastructures such as the LHC at CERN and its upgrade programmes, contributing expertise in beam instrumentation, accelerator design, and optimisation.
Novel accelerators: including plasma wakefield accelerators and ultra-compact accelerators-on-a-chip.
Accelerator applications: R&D into healthcare technologies and applies Data Science techniques to real-world challenges.

For more information, contact Dr Hao Zhang or visit liverpool.ac.uk/quasar/ liverpool.ac.uk/physics/research/accelerator-physics/

Condensed Matter Physics

CMP at Liverpool embraces a wide range of physics that is aimed at making a positive impact on life, technology and innovation by developing both fundamental and applied understanding relevant to modern issues. 17 academics, 15 professional research staff and research associates, and 20 PhD students work in our five research themes:
Advanced Characterisation utilises X-rays (both at the XMas beamline at Grenoble and in house) for X-ray diffraction, resonant X-ray scattering, grazing incidence measurements, spectroscopy and small angle scattering.
Advanced Materials includes research on Bio - and soft matter-printing, magnetic materials and structures, and quasicrystals and quasiperiodic media.
Chemical and Electrochemical Physics studies chemical physics of reaction dynamics as well as electrochemical interfaces.
Imaging and Medical Diagnostics use IR imaging in near and far-field to study biological specimens (particularly cancer biopsies).
Solar Energy Conversion research prepares and investigates new materials for both solar hydrogen and electricity production (solar cells).

For more information contact Dr Frank Jaeckel or visit liverpool.ac.uk/physics/research/condensed-matter-physics/

UNIVERSITY OF LIVERPOOL

Department of Physics

Nuclear Physics

Nuclear Physics at Liverpool encompasses many areas of research that range from enhancing fundamental understanding of the laws of physics by driving it to the extremes, to creating a positive impact on present issues such as medical treatment and preservation of the environment.

Our fundamental science aims to understand how nuclei can support the highest values of angular momentum; how single-particle and collective structure of nuclei evolve near the drip lines; the phenomenon of reflection asymmetry and shape coexistence in nuclei; the behaviour of the heaviest nuclei; and the phase equilibria of hadronic matter at extreme energy densities.

We perform our research at accelerator laboratories around the world, including those in Canada, Finland, Germany, Italy, Switzerland (CERN) and the USA. In many cases it exploits instrumentation that we have developed, such as AGATA, ALICE and the ISOLDE Solenoidal Spectrometer. This expertise in developing novel instrumentation underpins our applied research through projects like SIGMA and GRI+.

For more information contact Prof Robert Page or visit liverpool.ac.uk/nuclear-physics

Physics Education

The Physics Education cluster studies how students learn physics and how teaching practices affect outcomes. Comprising 4 academic staff and 1 PhD student, current research focuses on using machine learning to analyse socio-demographic disparities in degree outcomes, exploring AI's role in education, examining how institutional culture and psychology shape student identity and belonging, and developing inclusive public engagement experiences.

For more information contact Dr Andrew Low or visit liverpool.ac.uk/physics/research/physics-education-research/

Particle Physics

Our particle physics cluster is one of the largest in the UK and we conduct research into a wide range of phenomena at facilities across the globe, including CERN, Fermilab, JPARC, Sandford, Kamioka and PSI. We specialise in physics analysis and the development and delivery of detectors. Our 23 academics, 64 research staff, and 37 PhD students work across areas including: The **ATLAS** experiment at the LHC played a leading role in the discover of the Higgs boson. We now deepen our understanding of the Higgs, search for new physics and develop detectors for the HL-LHC. This is complemented by the **FASER** experiment. **LHCb** studies the behaviour of B mesons and develops future trackers. We study **Neutrino** oscillations at **T2K, Hyper-Kamiokande, SBND** and **DUNE**, and search for neutrinoless double beta decay with **LEGEND**. Our direct **Dark Matter** searches include **LZ** and **Darkside**, and applications of quantum technologies at **Magis** and **AION**. We make precision measurements of **Muon** properties like **g-2** and search for rare decays at **Mu2e** and **Mu3e**. Our research is underpinned by our long-standing expertise in development of new detectors including next generation silicon detectors and liquid argon time projection chambers.

For more information contact Prof Neil McCauley or visit liverpool.ac.uk/physics/research/particle-physics/

From our current PhD students

Sinead Eley (Particle Physics, LIV.INNO)

"I've just completed my first year of my PhD working on dark sector searches with the FASER detector. Having completed my undergraduate degree at Liverpool, I felt comfortable here and knew it was somewhere that I would be supported during my PhD. We have a strong community feeling here where everyone is welcoming and happy to have a chat. There have been countless opportunities during my first year, one that stands out is WONDRS, a conference specifically for gender minorities in STEM, this really helped to address the imposter syndrome many of us face as researchers."

More from our current PhD students

Adam McCarter (Nuclear Physics)

"I moved from Edinburgh to Liverpool to do a PhD in nuclear physics. Now in my final year, I have discovered a new isotope that decays by emitting protons. The experiment was conducted in Finland, where I spent a year on long term attachment. I have visited other labs in Italy and Poland, presented my work at international conferences and I have won beam time to look for another new proton emitter. These were unique opportunities, and I feel incredibly privileged to have worked with the fantastic group of people at Liverpool, who have made my PhD thoroughly enjoyable."

Baltazar Guedes (Condensed Matter)

"I am a second-year condensed matter physics PhD student, working with in-situ x-ray and electrochemical characterisation of materials, to obtain information on the structure changes of electrodes and electrolytes in electrochemical environments. Having spent my under-graduate years at the university and continuing with my PhD, both the university and city have been a friendly and welcoming place that I am more than happy to be working at. The department is very diverse and there is always something exciting to discuss with peers. Collaborations across the university enable to do research in ways we have never expected!"

Equality, Diversity and Inclusion

We are committed to equality, diversity, and inclusion (EDI). Our department is a JUNO practitioner (the IOP's flagship gender equality award) and we hold an Athena Swan silver award. The university has a Race Equality Charter bronze award and is part of Disability Confident and Stonewall Diversity Champions.

EDI in our department is led by staff and student champions. Recent activities include pursuing the IOP inclusion award and hosting the Conference for Undergraduate Women and Non-Binary Physicists. Postgraduate students play a crucial role in EDI as members of the EDI champions and in 2024 developed and delivered the first annual Woman and Non-binary Doctoral Researchers in STEM, WONDERS, conference.

We strive to help all students reach their potential, regardless of any disabilities or health conditions. Our inclusive programmes offer personalised support plans. If you have any questions, email the disability support team: disteam@liverpool.ac.uk

IOP Institute of Physics Juno Practitioner

Athena SWAN Silver Award

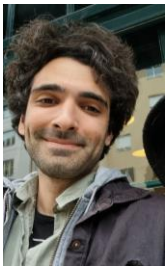
Race Equality Charter

Meet some of our alumni

Dr. Julia Tena Vidal

Júlia did her PhD in the particle physics group and the LIV.DAT CDT. She received the best PhD Award in 2023 for her outstanding work modelling neutrino interactions with matter. She is now working as a post-doctoral research assistant at the Tel Aviv University's Particle Physics Group.

Dr. Amir Salehilashkajani



Amir did his thesis in our Accelerator Physics group working on beam monitoring. His device was installed at CERN's Large Hadron Collider in 2022. He is now a research scientist at CoMind, developing non-invasive brain imaging methods for patients with traumatic brain injuries.

Dr. Jaimie Platt

Jaimie graduated from her Nuclear Physics Ph.D. investigating the feasibility of a novel gamma-ray imaging system for characterising radioactive waste in 2021. She now works as a Decommissioning Characterisation Consultant at Amentum.

Dr. Wai Yuen (Alan) Chan

Alan did his PhD in the ATLAS experiment at CERN searching for heavy Higgs bosons. After his graduation in 2021, he worked in quantum computing at the University of Tokyo.
Currently he is a researcher working at Brookhaven's Electron-Ion Collider Project, which is currently under construction.

A warm welcome from our Postgraduate Research team!