UNIVERSITY OF LIVERPOOL

Postdoctoral Research Associate in Silicon Tracking Detector R&D

Grade and salary: Grade 7 £39,355 - £45,413 pa
Working hours: Full time / 1 fte
Tenure: Fixed Term - position available until 31 May 2026 (initially)
Location: Liverpool campus
Faculty: School of Physical Sciences
Recruiting department contact: spshr@liverpool.ac.uk
Job ref: 095313

The School of Physical Sciences is working to create an inclusive environment which values a diverse workforce, and we recognise that many individuals value flexibility in their work/life balance. We particularly welcome applications from groups that are currently under-represented within the School of Physical Sciences. As an Athena Swan Silver Award holder, we are committed to gender equality. As an institution awarded the Race Equality Charter Bronze Award, we are dedicated to enhancing the representation, advancement, and achievement of minority ethnic staff members. The Department of Physics is a practitioner for the Institute of Physics Project. Additional resources on staff networks and EDI initiatives can be found here: https://www.liverpool.ac.uk/hr/diversityandequality/

The Role

Role overview and University context:

The Hadronic Matter Group of the Physics Department is seeking a Postdoctoral Research Associate to support its STFC-funded Electron Ion Collider R&D programme, which aims to develop new technologies for future particle vertexing and tracking silicon detectors.

In close collaboration with other UK universities and STFC laboratories, as well as in partnership with international institutions and accelerator laboratories, the R&D work of the Liverpool Hadronic Matter Group focuses on the development of Monolithic Active Pixel Sensors (MAPS), the state-of-the-art silicon sensor technology for high-precision vertexing and tracking of charged particles. Past and current projects include the upgrades of the Inner Tracking System (ITS) for the ALICE experiment at the Large Hadron Collider (LHC) at CERN (Switzerland). For future experiments investigating the nature and properties of cold and hot QCD matter produced in ultra-relativistic collisions such as at the LHC or at the Electron Ion Collider (EIC), the future particle accelerator to be built at Brookhaven National Laboratory in the USA, MAPS is the only silicon technology capable of satisfying the most demanding particle vertexing and tracking requirements, relying, for example, on increased granularity and lower material budget.

You will play a leading role in evaluating the performances of a number of prototype test structures and stitched sensors recently developed in a commercial 65 nm CMOS imaging process by a large international consortium of engineers and scientists for the ALICE ITS3 upgrade and the future experiments, ePIC@EIC and ALICE3@LHC. You will perform experimental data acquisition with radioactive sources in the Liverpool Semiconductor Detector Centre to characterise various design implementations and generations of these prototype sensors. You will also lead the analysis of the acquired data and be involved in beam test campaigns at accelerator laboratories. Other tasks relating to mechanical and electrical developments could also be considered.

You will collaborate with other researchers working on these projects (locally, nationally and internationally) as well as provide some day-to-day supervision for postgraduate and/or undergraduate students. You will also be expected to present the progress and results of your work at regular collaboration meetings and international workshops or conferences. A willingness to travel and the ability to communicate effectively with key stakeholders are essential. You will have a PhD (or will be close to submitting/defending your thesis) in

experimental nuclear or particle physics or in a discipline relevant to particle detector research (preferably associated with silicon detectors for high-energy physics).

You will have opportunities to access a range of researcher development resources, with the University of Liverpool sector leading in postdoctoral researcher development programmes such as Prosper.

The post is initially available until May 2026 and is expected to start as soon as possible. The salary will be determined depending on experience and qualification.

The Department of Physics

The Physics Department, part of the School of Physical Sciences, was one of the first departments established in the University in 1881 and has a long tradition of excellence in physics research. The Department has scored highly in three consecutive reviews by HEFCE - the national Research Assessment Exercise (RAE). This considerable achievement reflects the Department's international reputation in the fields of particle physics, nuclear physics condensed matter physics and accelerator science.

The first Professor of Physics at Liverpool was Sir Oliver Lodge, who made the world's first public radio transmission in 1894. Two years later, Lodge demonstrated the use of X-ray photography by taking an image of a bullet in a boy's wrist. It was the first time an X-ray had been used for surgical purposes. Professor Charles Glover Barkla's research into X-Rays won him the Nobel Prize for Physics in 1917, and Sir James Chadwick was awarded the Nobel Prize for Physics in 1935 for discovering the neutron. More recently, Sir Joseph Rotblat was awarded the Nobel Peace Prize in 1995 for his work on reducing the threat posed by nuclear weapons.

The Department is very well funded for research. There are currently approximately 44 academic staff who are responsible for the teaching and supervision of around 360 undergraduate and 170 postgraduate students. Over 40 full time research and computer physicists, professional, technical and electronic support staff together with extensive laboratory, workshop and design office facilities, support the research groups. Much of our research is carried out in the leading international centres for physics research: ILL (Grenoble), ESRF (Grenoble), ELETTRA (Trieste), CERN (Geneva), DESY (Hamburg), SLAC (Stanford), FNAL (Chicago), PSI (Villigen), JYFL (Jyväskylä), GANIL (Caen), GSI (Darmstadt) and ATLAS (Argonne).

The Department performs extremely well in both teaching and research as evidenced by excellent scores in teaching quality assessment, research assessment exercises and the national student survey. Further details of the department can be found on the web site: http://www.liverpool.ac.uk/physics

The Hadronic Matter Group

The group includes academics, post-doctoral researchers, PhD and undergraduate students. The funding for the group's work is mainly through STFC grants. These have funded major investments in silicon detector R&D and construction, as well as in novel physics data analyses using Machine Learning techniques, with postdoctoral research associates, undergraduate and postgraduate research students and technical staff.

The group currently carries out most of its research at the LHC (CERN, Switzerland) where the energy of the nuclear collisions is sufficient to produce partonic matter and the thermodynamics of the medium formed by these strongly interacting particles (the quark-gluon plasma) is investigated using the ALICE detector (A Large Ion Collider Experiment). The ALICE Collaboration (https://alice-collaboration.web.cern.ch/) is an international collaboration of approximately 2000 members from 170 institutions in 40 countries. The Liverpool group is well established in ALICE and has been a full member of the collaboration since 2014. The group recently joined the new ePIC collaboration (https://www.bnl.gov/eic/epic.php) consisting of hundreds of scientists and engineers in 171 institutions from 24 countries, to design a new experiment foreseen to be built at the future Electron Ion Collider (BNL, USA).

Beyond operational duties and responsibilities within ALICE, as well as leadership in physics analyses of the data, a very important part of the group's work involves the development of new silicon detector technologies for future high-energy physics particle vertexing and tracking detectors. There is a large state-of-the-art complex of clean rooms and laboratories in the Liverpool Semiconductor Detector Centre (LSDC) for this work. The group recently completed, in partnership with STFC Daresbury Laboratory, the construction of Outer Barrel modules and staves for the upgrade of the ALICE ITS2 detector, the largest silicon pixel particle detector entirely made of MAPS (ALPIDE sensors), totalling nearly 13 billion pixels and covering 10 m2, now operating during the LHC Run 3 data taking phase.

About you

Experience
Essential 1 Experience in high-energy nuclear or particle physics experimental research 2 Experience and/or interest in setting up, testing or commissioning of detection (sub-)systems used in high-energy physics experiments 3 Experience of work within a large international collaboration at a large-scale accelerator facility (e.g. CERN) 4 Track record of presentation(s) at international workshop(s) or conference(s)

Desirable

1 Track record in the development and/or construction of large-scale silicon tracking systems used in high-energy physics experiments

2 Expertise of Monolithic Active Pixel sensors

3 Experience with electronic circuit boards for data acquisition and powering

4 Publication record in peer-reviewed journals

Education, qualifications and training

Essential

1 PhD (or close to submitting/defending your thesis) in experimental nuclear or particle physics or in a discipline relevant to particle detector research (preferably associated with silicon detectors for high-energy physics)

Skills, general and specialist Knowledge

Essential

1 Practical laboratory skills

2 Computational skills relevant to analysing data from radiation detector systems

3 Writing skills

4 Ability to present clearly at meetings and conferences

5 Good communication skills

Desirable

1 Familiarity with Linux

2 Familiarity with C++

3 Experience with Monte Carlo simulation frameworks for high-energy physics data analyses

Personal attributes
Essential 1 Ability and willingness to travel overseas for extended periods 2 Ability to communicate effectively within an international collaboration 3 Ability to work flexibly and cooperatively with colleagues and collaborators, nationally and internationally 4 Ability to take responsibility for tasks or projects and manage workload 5 To show autonomy and initiative
Desirable 1 Evidenced commitment to own development 2 Ability to support and encourage undergraduate and postgraduate students

In addition to the above, all University of Liverpool staff are required to:

- Adhere to all University policies and procedures, completing all obligatory training and induction modules, including Equality & Diversity and Health & Safety.
- Respect confidentiality: all confidential information should be kept in confidence and not released to unauthorised persons.
- Participate in the University's Professional Development Review scheme and take a proactive approach to own professional development.
- Demonstrate customer service excellence in dealing with all stakeholders.
- Embody and uphold the University's Vision and Values.

About us

Established in 1881, we are an internationally renowned Russell Group university recognised for our high-quality teaching and research. We are consistently ranked as one of the best universities both nationally and globally, and the majority of our research is rated world leading or internationally excellent. Find out more about us.

Why Work Here

We recognise, appreciate and celebrate the incredible work our staff do every day. As well as generous terms and conditions, we offer a range of enviable benefits and provide support for colleague's wellbeing and development. Discover more about working here.

Moving from abroad

As a global institute, we welcome applicants from all nationalities, moving from a different country can be challenging and we would like to help as much as we can, we have put together

some information on eligibility to work documentation, accommodation, schools, healthcare, life in Liverpool and the UK as well as other practical information. Discover more about moving from abroad.

Our Staff

Whether it be their friendly colleagues, supportive managers or our outstanding facilities, our staff can explain better than anyone what it is like to work for us and why they enjoy their role. See what our colleagues have to say.

How to Apply

Application process

Our e-recruitment system enables you to register for an online account, where you can view, copy and edit your applications. Set up your account on our Vacancies Portal.

Once you submit your application you will receive an automatic email acknowledgment. You can view your application at any time by clicking into the application history section of your account.

The recruiting department will endeavour to respond to each application. However, if you have not heard within six weeks of the closing date, please take it that your application has not been successful on this occasion.

Job description

After the closing date this job description will be removed from our website. Should you wish to refer to this information at a later date please ensure you save a copy of this document.

Right to work

We have a legal responsibility to ensure that you have the right to work in the UK before you can start working for us. If you do not have the right to work in the UK already, any offer of employment we make to you will be conditional upon you gaining it. The UKVI have an interactive tool allowing you to immediately see if vacancies are eligible for a Skilled Worker visa. You will need to know the SOC code for the role, view our most used SOC codes, if none of these apply to this role, there are more codes on the eligibility checker. The skilled worker eligibility checker can be found on GOV.UK.

Disabilities and alternative formats

If you have any other requirements which will help you access the application or interview process or employment opportunities at the University, or if you require copies documentation in alternative formats, please email: jobs@liverpool.ac.uk or telephone 0151 794 6771.


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RACE CHARTER
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