Maynooth University
Ollscoil Mhá Nuad

Department of Theoretical Physics
Post-Doctoral Researcher/Senior Post-Doctoral Researcher (Quantum Computing)
(12-month contract)

The Role

We are seeking to appoint an energetic and enthusiastic Senior Post-doctoral Researcher in Theoretical Physics to work on development of compilers, quantum control protocols and algorithms for quantum information processing in quantum photonic systems as a part of the project "Quantum Computing in Ireland: A Software Platform for Multiple Qubit Technologies" (QCoIr) funded by Enterprise Ireland within the Disruptive Technology Innovation Fund. QCoIr which is the largest quantum computing project in Ireland is coordinated by IBM and involves a number of academic as well as industrial partners. This strategically important partnership makes Department of Theoretical Physics at Maynooth University an excellent place to pursue theoretical physics research in quantum computation in collaboration with relevant experimental efforts as well as to explore its technological applications. In the project, Maynooth University provides theoretical physics expertise to multiple work packages which involve collaborations primarily with Tyndall National Institute, Rockley Photonics and IBM.

The successful candidate will join the group of Prof. Jiri Vala and will be working in a close collaboration primarily with IBM.

Principal Duties

Principal duties involve development of quantum compilers, quantum control protocols and quantum information processing algorithms primarily in the context of quantum photonic systems, and also their implementation in quantum development environment such as IBM Qiskit for example. This includes for example devising protocols for exact and approximate compiling of quantum circuits to physical architectures, simulations and optimization of compilers and development of theoretical and practical tools for their performance assessment, design of quantum control protocols and algorithms within and beyond the conventional qubit paradigm. It is expected that this work will be carried out in a close collaboration primarily with IBM.

Administrative and other duties:

This will include:

- Participating and contributing to all meetings of relevant research teams;
- Providing regular contributions to relevant project reports;
- Presentations to the project management and funding bodies.

The ideal candidate will have:

- The candidate must have PhD in theoretical physics, or closely related subject;
- Research experience in quantum computing and numerical simulation of quantum systems strongly supported by an appropriate publication record;
- Excellent IT skills and programming experience for example in Python, Matlab, C/C++;
- Experience with software development platforms/environment such as GitHub;
- Experience with the IBM quantum development environment Qiskit.

In addition, the candidate for a **Senior Post-doctoral position must have a minimum of two years post-doctoral research experience** in a relevant field

Faculty and Research Institutes

The Faculty of Science and Engineering comprises the Departments of Biology, Chemistry, Computer Science, Electronic Engineering, Experimental Physics, Theoretical Physics, Mathematics and Statistics, and Psychology. The role of the Faculty is to co-ordinate the academic activities of individual departments, to oversee the strategic development of departments, and to support interdepartmental activities and programmes. The University has also developed a number of interdisciplinary Institutes to support excellent research and to build research capacity across disciplines.

Department

The Department of Theoretical Physics at Maynooth University was established in 1960 as the Department of Mathematical Physics, building on a tradition of natural science in Maynooth that stretches back to the founding of the college in 1795.

The strong and thriving research environment in the Department is evidenced by its extensive network of international collaborations and by its continuing success in securing external funding. It has a long tradition in quantum information and computation which has recently culminated in strategically important partnership in the project “Quantum Computing in Ireland: A Software Platform for Multiple Qubit Technologies” (QCoIr) funded by Enterprise Ireland within the Disruptive Technology Innovation Fund which involves also IBM Ireland Ltd., Tyndall National Institute, Rockley Photonics Ireland Ltd., University College Dublin, Equal 1 Laboratories Ireland Ltd., and MasterCard Ireland Ltd. Other research strengths exist in quantum field theory, cosmology, topological aspects of high energy and condensed matter physics, lattice gauge theory, and strongly correlated systems.

The Department offers high quality education in theoretical physics and the associated mathematics at both undergraduate and postgraduate level and hosts an active community of Ph.D. students and Post-doctoral fellows. It is also responsible for teaching of modules in mathematics for Engineering and Robotics students, and mathematics and physics for Product Design students.

The Department has excellent facilities on the Maynooth University North campus, including a dedicated computing laboratory. For more information on the Department, please visit https://www.maynoothuniversity.ie/theoretical-physics

The University

Maynooth University is committed to a strategy in which the primary University goals of excellent research and scholarship and outstanding education are interlinked and equally valued.

Maynooth University is one of the four constituent universities of the National University of Ireland and in 2019 was placed in the global top 50 universities under 50 years old in the Times Higher Education World University Rankings. Formally established as an autonomous university in 1997, but tracing its origins to the foundation of the Royal College of St. Patrick in 1795, Maynooth University draws on a heritage of over 200 years' commitment to education and scholarship. It is located in the University town of Maynooth, 25km from the centre of Dublin, Ireland's capital city.

The University is a modern institution - dynamic, research-led, engaged, and grounded in the traditions of liberal education. With more than 12,000 students, Maynooth is Ireland's fastest-growing university, yet we retain a collegial campus culture that is central to our ability to bring significant interdisciplinary expertise to bear in tackling some of the most fundamental challenges facing society today. MU has a distinctive disciplinary profile compared to other universities in Ireland, with research and teaching strengths in humanities and social sciences, science, electronic engineering, business, law and teacher education. The University has major research institutes and centres in the areas of: humanities;, social sciences; mathematics, computation and communication; human health; business and service innovation; climate change; and Geocomputation.

The University has, under the *University Strategic Plan 2012-17*, further enhanced its capacity and reputation for research, transformed its undergraduate curriculum, grown postgraduate enrolments and become even more international, diverse and engaged. MU makes, and is seen to make, an important and distinctive contribution to our national system of higher education.

Maynooth University is now embarking upon a new and exciting phase with the development of the *University Strategic Plan 2018-22,* with a vision to consolidate the international reputation of Maynooth University "*as a university known for outstanding teaching, excellent research, a global outlook, effective engagement with the society we serve, and our distinctive approach to the challenges facing modern higher education*."

The *University Strategic Plan 2018-22* builds on the institution's strengths and accomplishments, concentrating energy and resources on further development in research and postgraduate education. The strategy focuses on:

- targeted investment in research capacity in a number of priority areas;
- extending the postgraduate portfolio and growing the postgraduate community;
- realising the full benefits of our innovative undergraduate curriculum;
- enhancing the student experience;
- comprehensive and ethical internationalisation;
- equality diversity inclusion and interculturalism as enablers of academic excellence

These strategic goals are underpinned by a commitment to invest, first and foremost in people and opportunities for their development and success, and also in the systems and infrastructure required to achieve scholarly and educational objectives.

Selection and Appointment

- Only shortlisted candidates will be invited to attend for interview which will be carried out remotely using suitable teleconference means;
- Candidates invited for interview will be required to make a brief presentation remotely using suitable teleconference means;
- It is anticipated that interviews will be held during the week of the 1st February 2021.
- The appointment is expected to be effective from February 2021 or as soon as possible thereafter.

Equality and Diversity

Maynooth University values the enrichment that comes from a diverse community and seeks to promote equality, prevent discrimination and protect the human rights of each individual. To learn more about our commitment to Equality and Diversity, please read the Maynooth University Equality and Diversity Policy. Additionally, as an Athena SWAN Bronze Award Institute, we are committed to advancing gender equality across the University.

We aim to reflect the diversity of the community we serve and welcome applications from all individuals.

Terms and Conditions

This is a full time fixed term position for the initial duration of 12 months which can be extended up to the end of September 30th, 2023 contingent upon successful progress / achievement of project objectives and subject to research funding.

Data Protection Law

Maynooth University will process any personal data provided by you in connection with an application for this role in accordance with the General Data Protection Regulation and the Data Protection Acts 2018.

If your application is successful and you accept an offer of employment at Maynooth University, then your personal data will continue to be processed in accordance with Maynooth University's Staff Data Privacy Notice.

Both the privacy notices and further information relating to data protection, including Maynooth University's other data protection policies and processes, can be viewed at https://www.maynoothuniversity.ie/data-protection

Salary

Post-doctoral Researcher:	€38,631 - €44,657 per annum
Senior Post-doctoral Researcher:	€45,942 per annum

Appointment will be made in accordance with the Department of Finance pay guidelines.

Application Procedure

Closing Date:

23:30hrs (local Irish time) on **Sunday, 31st January 2021**

Please note all applications must be made via our **Online Recruitment Portal** at the following link:

https://www.maynoothuniversity.ie/human-resources/vacancies

Interested candidates should send a **Curriculum Vitae, Publication List, and a brief Statement of Research Interests (maximum of 4 pages).**

Applications must be submitted by the closing date and time specified above. Any applications which are still in progress at the closing time on the specified closing date will be cancelled automatically by the system.

Late applications will not be accepted.

Maynooth University is an equal opportunities employer

The position is subject to the Statutes of the University