Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Post Specification

Post Title:	**Research fellow** in optical switching for AI data centres
Post Status:	Specific Purpose Contract – Full time
Research Group / Department / School:	School of Computer Science and Statistics, IRIS Network AI and Sensing Research Group, Trinity College Dublin, the University of Dublin
Location:	Trinity College Dublin, School of Computer Science & Statistics, Trinity College Dublin, the University of Dublin College Green, Dublin 2, Ireland
Reports to:	Prof Marco Ruffini
Salary:	Appointment will be made on the, SFI Team member salary scale, new postdoctoral researcher, level 2A or Experienced Post Doctoral Researcher (Level 2B), depending on experience, at a point in line with Government Pay Policy [€51,176 - € 55,399 per annum], appointment will be made no higher than point 1, level 2B.
Hours of Work:	39 hours/week
Closing Date:	12 Noon (Irish Standard Time), 1st June 2026

Post Summary

The exponential growth of AI and high-performance computing workloads is placing unprecedented demands on data centre interconnect (DCI) infrastructure, with interconnect power consumption now exceeding that of compute in many deployments. Optical switching has emerged as a transformative approach to address this scaling challenge, but realising its potential requires moving beyond fixed network configurations toward architectures that can dynamically adapt to the traffic patterns of the applications they serve.
AI and HPC workloads exhibit strong structural regularity in their communication patterns: collective operations, parameter synchronisation, and pipeline stages produce traffic flows that are far from random. This predictability opens an opportunity: by characterising traffic patterns in real time and reconfiguring the optical topology to match them, the interconnect can be tuned to the workload rather than provisioned for the worst case. Realising this requires intelligent network control capable of building dynamic models from live traffic, predicting near-term demand, and translating predictions into wavelength tuning, optical path reconfiguration, and hybrid optical/electronic switching decisions on millisecond-to-microsecond timescales.
This research will develop machine learning models for traffic pattern recognition and prediction in AI/HPC data centres, and integrate them into a multi-layer control plane that drives optical topology reconfiguration. The work will use real workload traces from industry partners and target measurable improvements in GPU utilisation, end-to-end latency, and energy per bit, contributing to the broader goal of an order-of-magnitude reduction in DCI power consumption.

One Post Doctoral researcher position is available to work in the **area of optical switching for AI data centres**.
The applicants should have a solid theoretical background on machine learning, optical networks and network switching and be willing to engage in testbed-oriented research. The work will be **carried out in the OpenIreland research infrastructure**, the large-scale testbed for experimentation in open optical, wireless and cloud technologies, which is part of the **IRIS Network AI and Sensing Research Group**

The position will be based in the School of Computer Science and Statistics, with Prof. Ruffini research team and affiliated with the ADAPT research centre on AI, at Trinity College Dublin, Ireland. The researcher will have the opportunity to build their research portfolio within a range of projects within the team.
The position will be under the direction of **Prof. Marco Ruffini**

Standard Duties and Responsibilities of the Post

The primary focus of the EPR will be to perform research on the Research Ireland project in collaboration with Aston University in the UK. In addition, the EPR's activity will be broader and the EPR is also expected to:

- Conduct a specified programme of research under the supervision and direction of the Principal Investigator

- Engage in the dissemination of the results of the research in which they are engaged, as directed by, with the support of and under the supervision of the Principal Investigator. (Actively publish research findings in high impact journals and at key conferences as part of the research group effort to disseminate research outputs).
- Engage in the wider research and scholarly activities of the research group, School or University
- Interact closely with postgraduate research students associated with the same research group and possibly have an agreed role in supporting these students in their day-to-day research in conjunction with an academic supervisor.
- Take leadership and contribute to generation of papers, reports and other funding proposals.
- Carry out administrative work to support the program of research where required, including regular funding agency reports and internal reports etc.
- Carry out additional duties as may reasonably be required within the general scope and level of the post.
- Support collaboration with industry in areas relevant to the research group
- Engage in appropriate training and professional development opportunities as required by the Principal Investigator, School or University, in order to develop research skills and competencies.
- Gain experience and contribute to grant writing with the support of and under the supervision of the Principal Investigator
- Acquire generic and transferable skills (including project management, business skills and postgraduate mentoring/supervision).
- Contribute to broader outreach and engagement activities such as organising technical meetings, outreach to schools and other interested parties etc.

Funding Information

The post is primarily funded by Research Ireland but may involve funding from other sources based on the successful candidates' interests.

Person Specification

The appointable candidate will hold a PhD, preferably in a Computer Science or Electronic Engineering or related discipline (preferably with a few months of postdoctoral experience).

Qualifications

PhD or equivalent experience. The post is applicable to both new or experienced PhD holders, and salary will be commensurate with experience and achievement. The successful candidate will join a team of highly skilled and innovative researchers in next generation optical and wireless networks.

Knowledge & Experience (Essential & Desirable)

- Working knowledge of machine learning theory and algorithms.
- Working knowledge in running AI training and inference over large-scale multi-node systems
- Working knowledge of python programming language and Linux operating system.
- Experience in optical control and transmission experimentation in the laboratory.
- Experience in use of Software Defined Networking or Open optical systems.
- Optical laboratory experience and data collection.
- Knowledge of networking both at physical layer and protocols (layer2/layer3).
- Experience with network-oriented programming.
- Excellent written and oral communication skills
- The ability to work well in a group.
- The ability to collaborate internationally.
- Strong self-motivation and willing to learn attitude.

Skills & Competencies

- Excellent experimental skills working with machine learning applied to experimental data from optical networking testbeds.
- Evidence of accomplishment in research and development in the area of control planes for optical communications.
- A capability of working within a project team to achieve group-oriented results, in parallel to individual productivity and top-quality publications.
- Good communication, organisation and interpersonal skills.
- A commitment to gaining practical experience working on a research project.

Application Procedure

Applicants should submit a full Curriculum Vitae to include the names and contact details of 2 referees (including email addresses), to:

Prof. Marco Ruffini

Email Address: marco.ruffini@tcd.ie

Further Information for Applicants

URL Link to Area	www.tcd.ie
URL Link to Human Resources	https://www.tcd.ie/hr/

Trinity College Dublin, the University of Dublin

Trinity is Ireland's leading university and is ranked 87 in the World by the QS World University Ranking 2025. Founded in 1592, the University is steeped in history with a reputation for excellence in education, research and innovation.

Located on an iconic campus in the heart of Dublin's city centre, Trinity has 18,000 undergraduate and postgraduate students across our three faculties – Arts, Humanities, and Social Sciences; Engineering, Mathematics and Science; and Health Sciences.

Trinity is ranked as the Trinity is the 31st most international university in the world - Times Higher Education 2024 and has students and staff from over 120 countries.

The pursuit of excellence through research and scholarship is at the heart of a Trinity education, and our researchers have an outstanding publication record and strong record of grant success. Trinity has developed 19 broad-based multidisciplinary research themes that cut across disciplines and facilitate world-leading research and collaboration within the University and with colleagues around the world. Trinity is also home to 5 leading flagship research institutes:

- Trinity Biomedical Sciences Institute (TBSI)
- Trinity College Institute of Neuroscience (TCIN)
- Trinity Translational Medical Institute (TTMI)
- Trinity Long Room Hub Arts and Humanities Research Institute (TLRH)
- Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN)

Trinity is the top-ranked European university for producing entrepreneurs for the past five successive years and Europe's only representative in the world's top-50 universities (Pitchbook Universities Report).

Trinity is home to the famous Old Library and to the historic Book of Kells as well as other internationally significant holdings in manuscripts, maps and early printed material. The Trinity Library is a legal deposit library, granting the University the right to claim a copy of

every book published in Ireland and the UK. At present, the Library's holdings span approximately 6.5 million printed items, 400,000 e-books and 150,000 e-journals.

With over 120,000 alumni, Trinity's tradition of independent intellectual inquiry has produced some of the world's finest, most original minds including the writers Oscar Wilde and Samuel Beckett (Nobel laureates), the mathematician William Rowan Hamilton and the physicist Ernest Walton (Nobel laureate), the political thinker Edmund Burke, and the former President of Ireland Mary Robinson. This tradition finds expression today in a campus culture of scholarship, innovation, creativity, entrepreneurship and dedication to societal reform.

Rankings

Trinity College Dublin is the top ranked university in Ireland.

- Trinity College Dublin is Ireland's No.1 University - QS World University Ranking 2025; Times Higher Education World University Rankings 2024
- Trinity is ranked 87 in the World by the QS World University Ranking 2025
- Trinity is ranked 139 in the World by the Times Higher Education World University Rankings 2025

Full details are available at: www.tcd.ie/research/about/rankings.

The Selection Process in Trinity

The Selection Committee (Interview Panel) may include members of the Academic and Administrative community together with External Assessor(s) who are expert in the area. Applications will be acknowledged by email. If you do not receive confirmation of receipt within 1 day of submitting your application online, please contact the named Recruitment Partner on the job specification immediately and prior to the closing date/time.

Given the degree of co-ordination and planning to have a Selection Committee available on the specified date, the University regrets that it may not be in a position to offer alternate selection dates. Where candidates are unavailable, reserves may be drawn from a shortlist. Outcomes of interviews are notified in writing to candidates and are issued no later than 5 working days following the selection day.

In some instances the Selection Committee may avail of telephone or video conferencing. The University's selection methods may consist of any or all of the following: Interviews, Presentations, Psychometric Testing, References and Situational Exercises.

It is the policy of the University to conduct pre-employment medical screening/full pre-employment medicals. Information supplied by candidates in their application (Cover Letter and CV) will be used to shortlist for interview.

Applications from non-EEA citizens are welcomed. However, eligibility is determined by the Department of Business, Enterprise and Innovation and further information on the Highly Skills Eligible Occupations List is set out in Schedule 3 of the Regulations https://dbei.gov.ie/en/What-We-Do/Workplace-and-Skills/Employment-Permits/Employment-Permit-Eligibility/Highly-Skilled-Eligible-Occupations-List/ and the Ineligible Categories of Employment are set out in Schedule 4 of the Regulations https://dbei.gov.ie/en/What-We-Do/Workplace-and-Skills/Employment-Permits/Employment-Permit-Eligibility/Ineligible-Categories-of-Employment/ . Non-EEA candidates should note that the onus is on them to secure a visa to travel to Ireland prior to interview. Non-EEA candidates should also be aware that even if successful at interview, an appointment to the post is contingent on the securing of an employment permit.

Equal Opportunities Policy

Trinity is an equal opportunities employer and is committed to employment policies, procedures and practices which do not discriminate on grounds such as gender, civil status, family status, age, disability, race, religious belief, sexual orientation or membership of the travelling community. On that basis we encourage and welcome talented people from all backgrounds to join our staff community. Trinity's Diversity Statement can be viewed in full at https://www.tcd.ie/diversity-inclusion/diversity-statement.

Pension Entitlements

This is a pensionable position and the provisions of the Public Service Superannuation (Miscellaneous Provisions) Act 2004 will apply in relation to retirement age for pension purposes. Details of the relevant Pension Scheme will be provided to the successful applicant.

Applicants should note that they will be required to complete a Pre-Employment Declaration to confirm whether or not they have previously availed of an Irish Public Service Scheme of incentivised early retirement or enhanced redundancy payment. Applicants will also be required to declare any entitlements to a Public Service pension benefit (in payment or preserved) from any other Irish Public Service employment.

Applicants formerly employed by the Irish Public Service that may previously have availed of an Irish Public Service Scheme of Incentivised early retirement or enhanced redundancy payment should ensure that they are not precluded from re-engagement in the Irish Public Service under the terms of such Schemes. Such queries should be directed to an applicant's former Irish Public Service Employer in the first instance.

Application Procedure

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Name: Prof. Marco Ruffini

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