



Post Title:	PhD Studentship - Machine Learning for Two-phase Heat Transfer
Post Status:	Full-time
Research Group / Department / School:	Gibbons Research Group, Department of Mechanical, Manufacturing & Biomedical Engineering, School of Engineering, Trinity College Dublin, the University of Dublin
Location:	Parsons Building, Trinity College Dublin, the University of Dublin, College Green, Dublin 2, Ireland
Reports to:	Assistant Professor Michael Gibbons
Terms & Conditions:	€25,000 per annum stipend + cover of PhD Registration fees
Hours of Work:	Full time ~ 38 hours/week
Closing Date:	Open until suitable candidate is identified

Post Summary

The [Gibbons Lab](#) at Trinity College Dublin is seeking a PhD student to join an ongoing Royal Society–Research Ireland University Research Fellowship project focused on Machine Learning for the Design of Additively Manufactured Two-Phase Heat Transfer Surfaces.

From the processor in your phone to the AI compute in a data centre, every high-power electronic device faces the same limit: heat. This has created an urgent demand for next-generation heat transfer surfaces capable of handling ultra-high heat fluxes. One of the most promising approaches is flow boiling, in which a working fluid circulates over a heated surface and undergoes phase change, enabling exceptionally high heat transfer via the latent heat of vaporisation. The question nobody can currently answer is what those heated surfaces should look like.

Additive manufacturing enables the fabrication of spatially complex metal structures with features on the micron-scale. However, our capacity to intelligently design these surfaces is limited, because the models that predict boiling performance only work for the simple shapes that have been empirically tested.



The successful PhD student will conduct research in two-phase flows, with a focus on physics-informed machine learning to model flow boiling surface performance and integrate it with topology optimisation for intelligent design of phase-change surfaces.

The researcher will work closely with other members of a multidisciplinary project team including PIs and postgraduate researchers within this research cluster. This is an innovative cutting-edge project which will yield transformative developments in the field of two-phase flow. The Gibbons research group is known for their excellence in two-phase flow, heat transfer and surface engineering in Ireland and internationally. Funding is offered for 48 months. This post is held in the School of Engineering and Discipline of Mechanical, Manufacturing and Biomedical Engineering, Trinity College Dublin.

Standard Duties and Responsibilities of the Post

Applicants should ideally hold a primary degree in mechanical engineering, materials science, applied mathematics, physics, or computer science. Preference will be given to candidates with thermal fluids or machine learning experience. Specific skills that would strengthen an application include experience in some of the following: Heat transfer, Python, machine learning frameworks (PyTorch), computational fluid dynamics, optimisation, thermal-fluid experimentation, or additive manufacturing. Excellent written and oral communication skills are essential.

Funding Information

This position is supported by a Royal Society-Research Ireland University Research Fellowship [URF\R\261031].

Person Specification

Qualifications

The ideal candidate should hold an honours undergraduate degree in a relevant discipline (e.g. mechanical engineering, materials science, applied mathematics, physics, or computer science). A relevant master's degree is an advantage but is not required.

There is no single discipline that fits this project perfectly. It sits between thermal science, machine learning and materials science. We are looking for a strong candidate who is



motivated, intrigued by scientific discovery, diligent, pays attention – taking pride in their work; and overall a good team player. This is the primary criterion.

Knowledge & Experience

Essential

- Strong mathematical and analytical ability
- Programming experience, ideally in Python
- Demonstrable interest in heat transfer, machine learning, optimisation, or computational modelling
- Ability to plan, prioritise and meet deadlines
- Fluent English, with excellent written and oral communication –
(<https://www.tcd.ie/study/english-language-requirements/> - Band B Standard entry)

Desirable

- Coursework or project experience in machine learning, data science or numerical methods
- Heat transfer, fluid mechanics or thermodynamics background
- Experience with CFD (ANSYS Fluent, OpenFOAM, COMSOL) or optimisation methods
- Laboratory experience in thermal-fluid measurement
- Familiarity with additive manufacturing
- Evidence of peer-reviewed publications or international conference presentations

Skills & Competencies

While candidates may not possess all the skills above, applications are welcome from individuals with complementary skills. You will be trained — through structured modules, external short courses, and directly by the supervisor and the wider group. What matters is that you are open to that training, work hard, and are willing to work at the boundary between two fields rather than staying comfortably inside one.

Applications are particularly welcome from candidates whose background is strong in one half of the project (heat transfer/machine learning) and eager to upskill in the other.



Application Procedure

The application is in two parts:

1. Please complete the application form: <https://forms.cloud.microsoft/e/uqzauBzwqR>.
2. Send **one** combined PDF containing your CV, academic transcripts, and a short cover letter (maximum one page) setting out why this project interests you and what you hope to get from a PhD. Please include the names and contact details of 2 referees (including email addresses) as part of the PDF. Name the combined PDF **Surname_Firstname.pdf** and send to gibbonm3@tcd.ie.

Only shortlisted applicants will be contacted. The next stage is a Microsoft Teams or Zoom call with Asst. Prof Gibbons and the team.

Further Information for Applicants

Gibbons Lab Research Group	https://www.gibbonslab.com/
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 75th in the world (QS World University Rankings 2027). 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 17th most international university in the world (Times Higher Education Rankings 2020) 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 is the top ranked university in Ireland and ranked 75th in the world (QS World University Rankings 2026). Trinity ranks in the top 50 in the world on 4 subjects and in the top 100 in 18 subjects (QS World University Rankings by Subject 2019). 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>.



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