



PostGraduate Institute
for measurement science

IMPACT THROUGH PARTNERSHIP

BUILDING FUTURE LEADERS AND MEASUREMENT EXPERTS



Department for
Business, Energy
& Industrial Strategy



University of
Strathclyde
Glasgow



UNIVERSITY OF
SURREY

About us

The Postgraduate Institute for Measurement Science (PGI) was developed through a strategic partnership between the National Physical Laboratory (NPL), the UK's National Metrology Institute (NMI) and a Department for Business, Energy and Industrial Strategy (BEIS) partner organisation, alongside the University of Strathclyde and the University of Surrey, two prominent academic institutions. The PGI is a leading institute for postgraduate research and training in measurement in the UK and for the development of a pipeline of industry-ready talent.

The PGI recognises that the route to real-world impact for students and their research is through partnerships, with all sizes of business, from start-ups to corporate multinationals, charities and government organisations. The PGI offers a range of study and funding models, and opportunities to make it easy to collaborate and gain access to:

Talented scientists, engineers and academics

Excellent research facilities

Innovation culture and networks

The collaborative model of investment in PhD studentships enables a cost efficient studentship, along with flexible co-supervision. This provides significant advantages to all partners – providing increased access to a wide variety of knowledge and capability as well as a diverse and enriching range of experience for the Postgraduate Researchers (PGRs).

The postgraduate programme on offer is focused on developing world-class researchers with a mastery of scientific and engineering methodologies and professional skills. Through developing knowledge and skills in measurement science and its application, PGRs will bring innovation and scientific advancement to their field of research and industrial sector.

The main focus for the PGI is to support industry and academia and to create global impact through measurement science.



Why engage with us?

Measurement underpins all science and engineering, and its application in our technology-based society. A sound knowledge and understanding of measurement, uncertainty and risk is essential for advancement and innovation. Training in these particular areas enables PGI researchers to develop a mindset that will allow them to get the most out of their research and develop into leadership roles by enhancing their professional skills, communication and presentation ability, scientific writing, problem-solving and analysis.

TOGETHER WE WILL

Develop creative measurement solutions to complex problems.

Bring together diverse expertise – from scientific, academic and business communities and beyond – to tackle problems from every angle.

Make an impact on society through developing ground-breaking ideas, innovative solutions and critical thought leadership required to address some of the most challenging problems facing our world today.



Responding to industry need

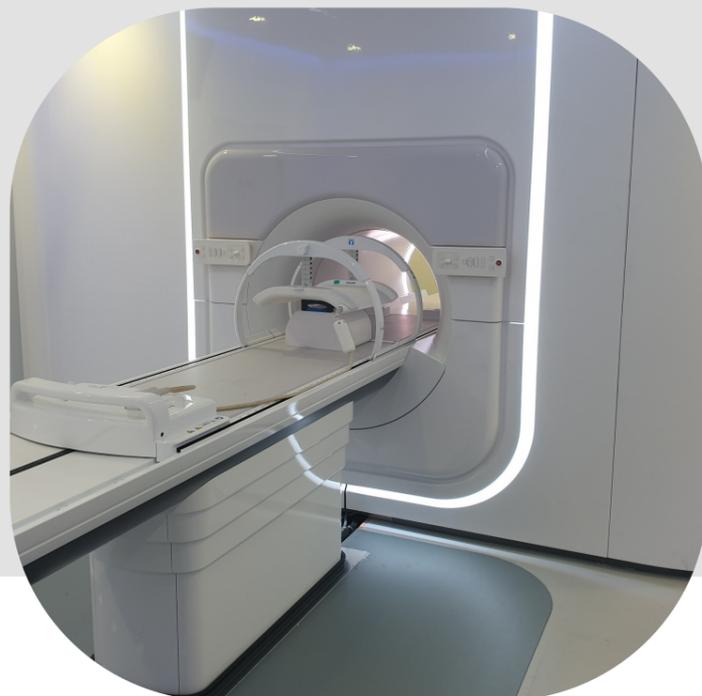
Good measurement science reduces business risks. The PGI's affiliation with the UK's National Physical Laboratory (NPL), a world leading organisation in measurement science, and its strategic partners at the Universities of Strathclyde and Surrey provides direct access to a wealth of knowledge and close links to industry. We offer a new model of engagement to develop the next generation of highly trained and adaptable scientists and engineers, who can pave the way to revolutionise UK industry.

Nearly 41% of our students have their PhD either funded or linked to industry.



Project outline

Aaron's project involves developing phantoms and related materials to allow audit of the new Unity Magnetic Resonance (MR-linac) system developed by Elekta for image guided radiotherapy. Elekta Unity combines state of the art MR imaging with state-of-the-art radiotherapy delivery.



PhD in Medical Physics

Aaron Axford

"Aaron brought many great ideas to the project including using 3D printing for phantom manufacturing. He has published his work in spite of the restrictions caused by the pandemic which is a great testament to him."

Phil Evans, Surrey Supervisor

"This studentship project extended the strong collaboration between Surrey's Centre for Vision, Speech and Signal Processing (CVSSP), NPL and Elekta and has helped to support the development and application of new clinical techniques, which are made possible by Elekta."

Dave Roberts, Elekta

Industrial applications

Elekta has set a new standard for treatment and it is anticipated that the clinical use of this technology will increase in the future. One challenge is how to demonstrate its accuracy and audit the quality of treatment delivered with it at different centres.

Outcomes

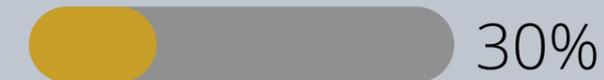
The project has involved using new 3D printing technology, state of art alanine dosimetry (which is delivered by NPL) coupled with anatomical phantom design to produce a system that allows stringent testing of the new technology that can be used for audit around the country and around the world.



Creating a global footprint

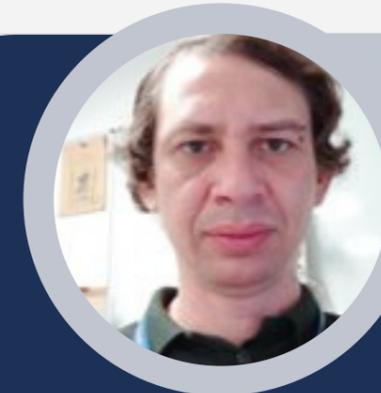
The PGI works with leading global academic and measurement institutes to understand and develop solutions for global challenges affecting the environment, manufacturing, security and health. By working with us you will have access to world experts and facilities, helping you to find solutions to your measurement challenges.

Nearly 30% of our students are non-UK nationals.



Project outline

The aim of Renán's project is to identify signals that cause measurement error in static electricity meters in order to examine possible weaknesses in the meter design, from the analogue front-end to the digital signal processor and improve performance of smart meters.



Electricity Meters

Renán Quijano

"[The PGI] has provided me with valuable metrology knowledge and the chance to be involved in an international research project related to my PhD. I feel confident to bring the acquired skills and knowledge back to my country."

Renán Quijano

International Involvement

This project is fully funded by the Mexican National Council for Science and Technology (CONACYT) and the Secretariat of Energy. It is also supported by the University of Strathclyde and NPL partnership. Links have been made with other National Metrology Institutes, particularly with VSL in the Netherlands.

Industrial applications

The analysis of the error root cause is useful to standards organizations such as IEC and ANSI, and also to electricity meter manufacturers and power/energy integrated circuits designers.

Outcomes

A major output of this project is to provide knowledge and recommendations to establish new tests and test conditions to certify the accuracy of electricity meters in the presence of variable power quality.



Stronger with partners

The Postgraduate Institute for Measurement Science is a strategic partnership between the:

UK Government Department of Business, Energy, and Industrial Strategy (BEIS)

The Department for Business, Energy & Industrial Strategy is supported by 42 agencies and public bodies. It is responsible for a number of UK Government policy areas such as business and industrial strategy, science, innovation, energy and climate change. The department is in charge of leading the Government's relationships with businesses, along with securing affordable and clean energy supplies to the country. In particular, it is responsible for ensuring cutting-edge research, science and innovation within UK.

The Department for Business, Energy & Industrial Strategy is supported by 42 agencies and public bodies. It is responsible for a number of UK Government policy areas such as business and industrial strategy, science, innovation, energy and climate change. The department is in charge of leading the Government's relationships with businesses, along with securing affordable and clean energy supplies to the country. In particular, it is responsible for ensuring cutting-edge research, science and innovation within UK.



University of Surrey, South of England

The University of Surrey is a world-class, research-led university committed to research excellence. Its research seeks to answer global challenges, drive innovation and deliver real-world impact. The university recognises that external partners are a vital route to real-world impact for its staff and students, and partners with all sizes of business, from the entrepreneur to the multinational corporate, charities and government organisations, to support its researchers on their journey to start and grow a career.

The National Physical Laboratory (NPL)

NPL is the UK's National Metrology Institute, developing and maintaining the national primary measurement standards. It is a BEIS partner organisation that undertakes excellent science and engineering to deliver extraordinary impact for the UK and provides the measurement capability that underpins the UK's prosperity and quality of life. From accelerating new antibiotics and more effective cancer treatments to developing unhackable quantum communications and super-fast 5G, NPL's expertise is crucial in researching, developing and testing new products and processes.

NPL is the UK's National Metrology Institute, developing and maintaining the national primary measurement standards. It is a BEIS partner organisation that undertakes excellent science and engineering to deliver extraordinary impact for the UK and provides the measurement capability that underpins the UK's prosperity and quality of life. From accelerating new antibiotics and more effective cancer treatments to developing unhackable quantum communications and super-fast 5G, NPL's expertise is crucial in researching, developing and testing new products and processes.



PostGraduate Institute for measurement science



University of Strathclyde, Scotland

Research and innovation is central to the University of Strathclyde and its research centres are dedicated to finding solutions to global challenges and transforming the way academics, business, industry and the public sector collaborate. Researchers are delivering pioneering techniques across many domains, including advanced manufacturing and materials, energy, health and wellbeing, and measurement science. The University was listed in the top 20 universities for research intensity according to the Times Higher Education analysis of the Research Excellence Framework (2014).

Delivering better together

The PGI recognises that external partners are the route to real-world impact for our students and their research, and partner with all sizes of business, from start-ups to the multinational corporate, charities and government organisations. What is on offer is a range of study and funding models, frameworks and opportunities to make it easy to collaborate and gain access to talented scientists and academics, excellent research facilities, innovation culture and networks.

The collaborative model of investment in PhD studentships, along with a flexible implementation of co-supervision, provides significant advantages to all stakeholders – providing increased access to a wide variety of knowledge and capability for the partners, a diverse range of experience for the PGRs, and reduced cost of studentships through shared funding. This collaborative investment model also facilitates the leveraging of studentship funding to grow investment from industry and other third-party funders. There has been a total of £26M investment in studentships associated with the PGI since January 2015.



Our Partners



What we deliver

Training

As measurement underpins all science and engineering and its application in our technology-based society, a sound knowledge and understanding of measurement and risk and how to manage measurement uncertainty, is therefore critical. Our training programme is designed to give students a competitive advantage, building strong foundations in research and professional development practices, which will broaden their individual skillsets. Through developing knowledge and skills in measurement science and its application, PGRs will bring innovation and scientific advancement to their field of research and industrial sector.

Research

As a measure of academic achievement and the contribution that PGI students make to the body of scientific knowledge, co-authoring publications in scientific journals and conference proceedings constitutes the widely recognised and accepted approach. The number of publications that NPL postgraduate students contribute to has been consistently high over the past five years making up around 15% of all NPL publications and amounting to 349 articles in total.

Cohort experience

The PGI encourages its students to extend their links to industry and other organisations in their fields giving them the opportunity to engage in a diverse range of experiences from organised events such as the annual conference to individual placement with other teams such as outreach and public engagement.

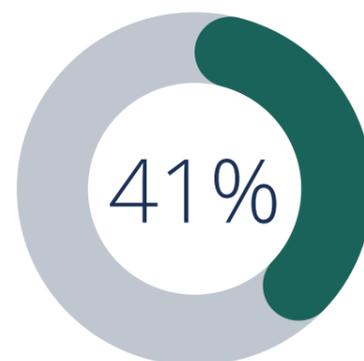


Transitioning talent

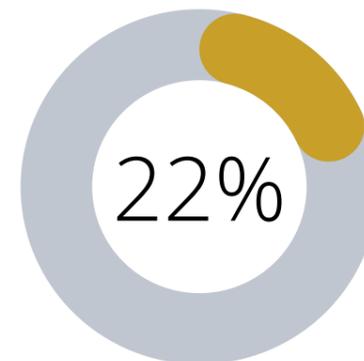
PGI alumni have embarked on diverse career pathways, ranging from postdoctoral researcher positions, to trainee patent attorney and CEO at a quantum technology start-up.

- Over 41% of our graduates now work in industry and hold a variety of different types of roles, with many having achieved significant promotions in their company.
- A considerable number of students have been successful in securing roles at NPL after completing their PhD, where they continue to make a positive impact on research and commercial activities.
- More than 22% proceed to take up an academic role and publish distinguished papers and win awards.
- Around 6% of students are applying their skills to other sectors including scientific charities and government departments.

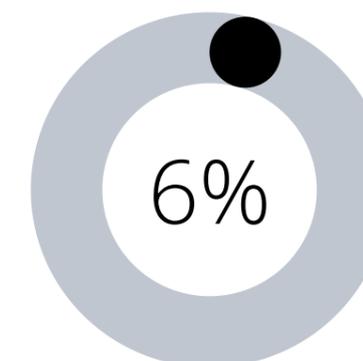
Student destinations for PGI graduates (sample size: information available for 152 out of 193 alumni)



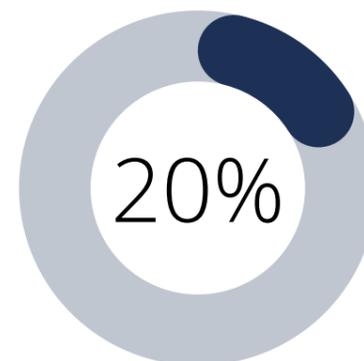
Industry



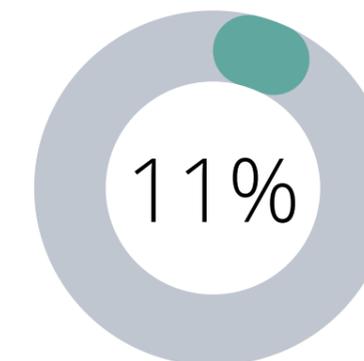
Academia



Other



NPL



Research

What we offer our partners?

By adopting a collaborative approach, we are enhancing knowledge and skills in measurement science and its application, ensuring innovation and advancement in many fields of research, technology and industry.

Industry

Located at the UK's National Physical Laboratory, a world leading organisation in measurement science, and through its strategic partners at the Universities of Strathclyde and Surrey the PGI has direct access to a wealth of knowledge and close links to industry. What we offer is a proven model of engagement to develop the next generation of highly trained and adaptable scientists and engineers, who can pave the way to revolutionise UK industry. Good measurement science reduces business risks throughout the product life-cycle and improves confidence and efficiency. Together we can help to transform your business and make it more productive and effective for end-users.

Higher Education Institutions

The PGI offers a nurturing environment with an excellent programme for development and student experience. The PGI is a community of over 200 students and around 250 supervisors across the UK, including academics from leading UK universities. Our community is diverse and offers excellent interdisciplinary experience. Our programme is extremely flexible, and the welfare of the students and the needs of the supervisors sits at the heart of everything we do.

International

The PGI works with leading global academic and measurement institutes to understand and develop solutions for global challenges affecting the environment, manufacturing, security and health. By working with us you will have access to world experts and facilities, helping you to find solutions to your measurement challenges.

Call to Action

We want to expand our community, so **contact us** to find out more about how the **PGI** could help you.

[*pgi@npl.co.uk*](mailto:pgi@npl.co.uk)

For more ways to 'Contact Us'

 pgi@npl.co.uk

 [@PGImetrology](https://twitter.com/PGImetrology)

 www.npl.co.uk/pgi

 [@pgimetrology](https://www.linkedin.com/company/pgimetrology)

Editing Team

Tarek Haloubi

Jennifer Blair

Jamie McMillan

University of Edinburgh

University of Strathclyde

University of Surrey

doi.org/10.47120/npl.9315

Images courtesy of NPL and associated members of the PGI.
©The Postgraduate Institute for Measurement Science, 2021.