1872 PRIFYSGOL ABERYSTWYTH UNIVERSITY | Department of Physics

Postgraduate studies in

Physics

Contents

Important information

The programme information published in this brochure was correct at time of going to print (February 2025) and may be subject to change. Prospective students are advised to check the definitive programme information, including entry requirements, that is available on our website before making an application, to ensure that the programme meets their needs.

Welcome

There has been a long tradition of teaching Physics and Astronomy at Aberystwyth since the University was first established in the Old College on the sea front in 1872. Over 150 years later, we continue to offer our students a high quality teaching and learning experience and are rated in the Top 10 in the UK for Teaching Quality and Student Experience for the subject of Physics & Astronomy (Good University Guide 2025, The Times and Sunday Times).

Our aim is to provide the highest quality education in a friendly and supportive environment and to undertake internationally competitive, collaborative research in Space Physics, Materials Physics and Quantum Physics. Our lecturers are research-active, involved in projects ranging from engineering new materials and novel instruments to planetary missions and ground-breaking studies of the Sun's activity. Their research feeds into their teaching so that you can be assured that you will be taught the latest ideas by some of the leading experts in the UK in their fields.

The Department is housed in one of the most distinctive and architecturally renowned buildings on Penglais campus, where lecture theatres, laboratories, study areas and the Physical Sciences Library are located together. Recent refurbishment ensures that we continue to provide a stimulating learning environment for a growing body of students from all over the world.

A degree in Physics is an excellent preparation for careers in areas such as teaching and engineering as well as providing the first step to becoming a professional scientist.

Why not visit us to see for yourself what makes Aberystwyth such an incredible place to study. We look forward to welcoming you to the Department.

Professor Jon Gough
Head of Department

Our courses

Taught degrees

Research degrees

Space Engineering

MSc

The MSc in Space Engineering at Aberystwyth University is the perfect choice for graduates with a first degree in a STEM subject who wish to develop knowledge and skills relevant to Space Exploration. This course is taught by experts in Space Science and Technology who are members of international teams and space missions studying the Sun, the Moon, and planetary systems. You will be given the opportunity to get involved in active research topics through your MSc project work.

An MSc in Space Engineering will give you the opportunity to tackle the challenges of Space Exploration. You will undertake project work alongside active researchers, and receive expert insight into the UK Space Industry from external speakers. Staff have expertise in modelling visualisation, ground-based experimentation and space instrumentation, with specialisms in photonics and robotics.

This exciting course merges the knowledge and experience that cuts across science, technology, engineering, mathematics and business at the University.

The range of modules available provides you with a fundamental knowledge of the Solar System and beyond and an appreciation of the technology and skills required to explore extra-terrestrial space, including design, observation, measurement, analysis, communication and project management.

You will gain advanced knowledge and understanding of space engineering and space exploration with additional skills in research, critical analysis and the interpretation of data, problem solving, report writing and delivering presentations.

Modules

Core modules that you may study on this course include:

- Advanced Planetary Exploration
- Advanced Research Skills
- Professional and Research Skills
- MSc Project

You will also choose from a range of optional modules which currently include:

- EM Theory and Microwave Devices
- Fundamentals of Intelligent Systems
- Quality and Engineering Management
- Project Management Tools and Techniques
- Programming for Scientists
- International Strategy and Operations
- Leading and Managing Projects
- Machine Learning for Intelligent Systems
- Computational Intelligence.

For more details and the latest information, see our website.

Key facts

Course code: FH57

Duration: 1 year full-time

Contact time: Approximately 10-14 hours a week in the first two semesters, then mutually agreed contact time with assigned supervisor.

Wireless Communications and Radio Frequency Systems Engineering

MSc

The Radio Spectrum, part of the wider electromagnetic spectrum, ranges from very low frequency (VLF) to extremely high frequency (EHF). In engineering, we consider the wireless connectivity between places, people, and devices, as a 'soft infrastructure', enabling mobile phone communication, navigation systems, radar systems, and many others.

This one-year full-time Masters degree will expand your theoretical knowledge and develop your technical, practical and analytic skills to harness the potential of the radio spectrum technologies essential in the running of a modern economy.

We have funded research collaborations in several key fields including advanced antennas for 5G and beyond, spectrum monitoring and management, and high-frequency outdoor RF testing. You will work alongside radio spectrum researchers and engineers to gain training in spectrum-based innovation, research and development. You will have the opportunity to study a variety of specialist topics such as radar, sensors and devices using research-led, theoretical approaches and practical work. A research project, linked strongly to industry demands and current research topics, will enable you to develop wider skills in research, communication and employability to provide you with a springboard into industry or further academic research.

Key facts

Course code: F936

Duration: 1 year full-time

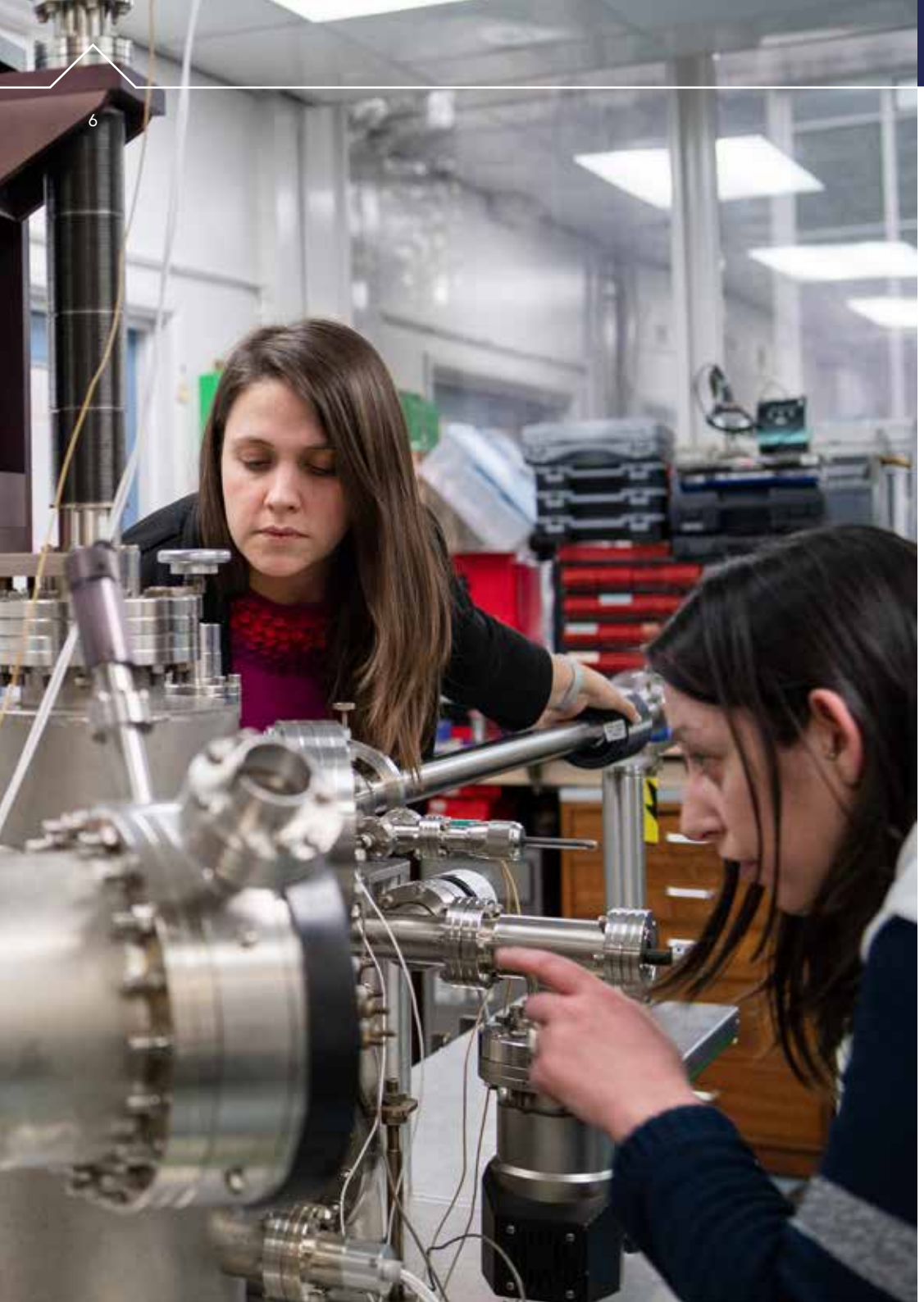
Contact time: Approximately 10-14 hours a week in the first two semesters, then mutually agreed contact time with assigned supervisor.

Modules

Core modules that you may study on this course include:

- Advanced Wireless Networks - 5G and Beyond
- Electromagnetic Theory and Microwave Devices
- Antennas and Wave Propagation
- Professional and Research Skills
- MSc Project.

For more details and the latest information, see our website.



MPhil, PhD

We offer PhD and MPhil degrees in a wide range of research areas within Physics. These include:

Space Physics:

- development of advanced data analysis tools for solar, solar wind and planetary/lunar physics
- investigating, through modelling and observation, the unknown heating mechanisms of the solar atmosphere and solar wind
- multi-spacecraft plasma observations in the solar wind
- impact of the solar wind on planetary atmospheres and space weather
- total solar eclipse observations
- development of instrumentation for solar observations and planetary exploration
- using radio telescopes to study the formation of stars across the galaxy
- investigating Jupiter's aurora using infrared telescopes

Materials & Quantum Physics:

- functional materials derived from diamonds and graphene
- supramolecular materials, optoelectronics, soft nanophotonics and low-dimensional semiconductors
- open quantum systems and sequential measurement processes
- quantum feedback networks

Our world-class facilities include access to powerful Super Computing and custom-built spectroscopic and imaging equipment.

We offer studentships each year, with funding available for fees and stipends. Funding includes Research Council Studentships, industrial partnership Studentships, international studentships, Coleg Cymraeg Cenedlaethol (Welsh-medium) and Aberystwyth University scholarships. We also offer three scholarships each year for non-EU postgraduates to cover the difference between overseas fees and UK/ EU fees.

Note that some of the scholarships and funding sources have application deadlines that come quite early in the year (e.g. end of January), and that some funding applications ask for proposals which require input from staff members. Please contact us directly for advice. The Physics contact for PG studies is Dr Owen Roberts (**owr10@aber.ac.uk**).

For further information see our website, or contact us.

Our research

Research projects are offered in consultation with the research groups below. We welcome informal queries from any potential PhD applicant interested in our fields of research.

Space Physics:

Energy and matter emerge from the Sun and flow through our heliosphere, interacting with planetary atmospheres and surfaces, powering many of the processes which shape our world and define the planetary environment we live in. The Space Physics Group studies this system from the formation of stars elsewhere in the galaxy, the development of eruptive features on the Sun, the evolution and structure of material in the solar wind, and the impact of this flow on the environments of the planets. Our research increasingly uses machine learning as a tool to interpret large datasets. The group is involved in several current or planned space missions, and has a programme of developing novel optical systems and robotic components for space exploration.

Our computational modelling, data processing and instrument development expertise is recognised in international collaboration and missions including ExoMars, JUICE, BepiColombo, PUNCH, and a project to develop operational space weather capability for the UK Met Office.

Materials & Quantum Physics:

Our research expertise lies in measuring and predicting the properties of materials at the atomic level using unique combinations of experimental and theoretical methods including bespoke instrumentation developed within the Department, and linking to macroscopic applications in photonic, radio and quantum technology. This has enabled interdisciplinary projects in sectors such as photonics (polymer opals), health (nanoparticles), space (camera calibration), energy (transparent conductors), and digital technology (quantum control). We have funded research partnerships in several key fields including low-dimensional materials, solar photovoltaic research, photonics, radio spectrum technology and quantum information/ control.

(Photo credit: ESA)

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