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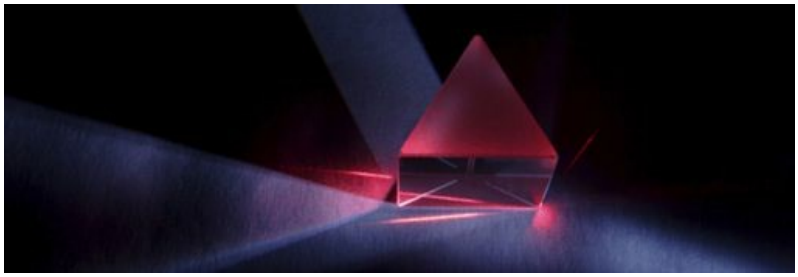
Physics and Astronomy PhD (Molecular Physics specialism)



Postgraduate doctoral research degree in Physics and Astronomy PhD (Molecular Physics specialism):

Molecular physics research is directed towards the study of the reactions of charge particles with neutral molecules at low energies. As well as the fundamental aspects of the research, the results have important applications to the physics and chemistry of naturally occurring plasmas, industrial plasmas (such as surface etchant plasmas), chemical lasers, pollutant monitoring, and trace gas detection.

Study here and find out why the University of Birmingham has been awarded The Times and The Sunday Times University of the Year 2013-14 (http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)

Course fact file

Type of Course: Doctoral research

Study Options: Full time

Duration: PhD: 3.5 years full-time; MSc by research: 1 year full-time

Start date: Contact the School directly for further information

Related courses

Postgraduate research - School of Physics and Astronomy (/schools/physics/postgraduate/postgraduate-research.aspx)

Contact

Admissions Tutor: Dr Chris Mayhew

Contact us online (http://bham.hobsons.co.uk/ask.aspx?cid=1223&did=24) or at +44 (0)121 414 4592/4683.

School of Physics and Astronomy (/schools/physics/index.aspx)

Details

Molecular physics research is directed towards the study of the reactions of charge particles with neutral molecules at low energies. As well as the fundamental aspects of the research, the results have important applications to the physics and chemistry of naturally occurring plasmas, industrial plasmas (such as surface etchant plasmas), chemical lasers, pollutant monitoring, and trace gas detection.

Our research programme provides reaction rate coefficients, and identifies the product ions of ion-molecule and electron-molecule processes. We use the following equipment built at the University: a variable temperature selected ion flow tube instrument to study bimolecular ion-molecule reactions in 0.5 Torr helium under thermal conditions, and an electron swarm instrument, which provides unique data on electron-molecule collisions as a function of mean electron energy in ~1 bar buffer gas.

Our research programmes are greatly expanding the database on the fundamental processes occurring in technologically important plasmas, so that more accurate models of plasmas can be constructed. Simulations resulting from these models will enable opportunities for new developments in plasma processing to be identified.

In addition, we are establishing a multidisciplinary research facility for sensitive and selective trace gas analysis using a proton transfer reaction mass spectrometer (PTRMS). The research programme comprises core activities based in molecular physics, together with a number of collaborative research projects in the areas of detection, atmospheric, medical, and materials science research. As new applications emerge, these will synergistically feed into the core programme of research to develop the PTR-MS and to explore gas-phase ion-molecule chemistry.

Related links

School of Physics and Astronomy (/schools/physics/index.aspx)

Fees and funding

Standard fees (/postgraduate/dr-fees/tuition.aspx) apply.
Learn more about **fees and funding (/postgraduate/dr-fees/index.aspx)**

Scholarships and studentships
We have a number of studentships supported by the UK research councils EPSRC and STFC available each year, including some CASE awards. These studentships cover the costs of tuition fees and provide a subsistence allowance for 3.5 years. They are available to UK nationals with at least an upper second-class Honours degree from a UK university, or equivalent. Preference is usually given to those holding four-year MPhys or MSci degrees.

We offer about half a dozen postgraduate teaching assistantships each year as top-ups to EPSRC and STFC studentships. There are also substantial opportunities for postgraduate demonstrators. EU nationals may be eligible for fees-only awards, which are occasionally supplemented by the School. Scholarships may be available, for more information contact the School directly or email **sfo@contacts.bham.ac.uk (mailto:sfo@contacts.bham.ac.uk)** .

International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

Entry requirements

Learn more about **entry requirements (http://www.birmingham.ac.uk/students/dr/requirements)** .

International students
We accept a range of qualifications from different countries – learn more about **international entry requirements (/postgraduate/requirements-dr/step1.aspx)** .

Standard English language requirements (/postgraduate/requirements-pgt/international/index.aspx) apply.

How to apply

Learn more about **applying (/postgraduate/requirements-dr/index.aspx)**

Apply now (https://pga.bham.ac.uk/lpages/EPS005.htm)

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the **How to apply pages (http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx)**

Apply now (https://pga.bham.ac.uk/lpages/EPS005.htm)

Related links

Postgraduate degree courses - School of Physics and Astronomy (/schools/physics/postgraduate/index.aspx)

Research interests of staff

The School of Physics and Astronomy was placed among the leading research institutions in the latest (2008) Research Assessment Exercise.

Our research portfolio is wide-ranging, and covers three principal themes: Particle and Nuclear Physics; Quantum Matter and Nanoscale Science; and Astronomy. We have over 120 academic and research staff together with 120 graduate students with around 50 technical and clerical support staff. Our annual research income is over £8 million and more than 250 research publications are produced each year.

Visit the website for the **Molecular Physics (/research/activity/physics/quantum/molecular/index.aspx)** research group for further information.

Related research

- **Molecular Physics - Physics and Astronomy research (/research/activity/physics/quantum/molecular/index.aspx)**
- **School of Physics and Astronomy research (/research/activity/physics/index.aspx)**

Related staff

Dr Christopher Mayhew (/staff/profiles/physics/mayhew-christopher.aspx)

Employability

University Careers Network

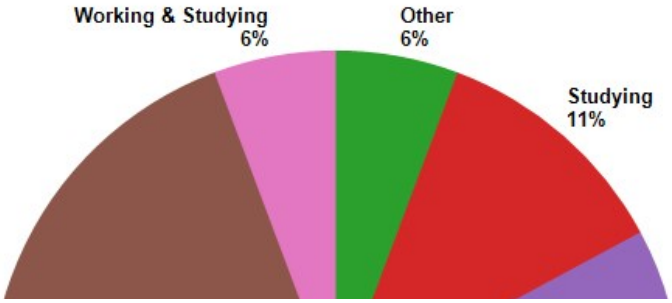
Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

Our unique careers guidance service is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team source exclusive work experience opportunities to help you stand out amongst the competition, with mentoring, global internships and placements available to you. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge.

If you make the most of the **wide range of services (https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx)** you will be able to develop your career from the moment you arrive.

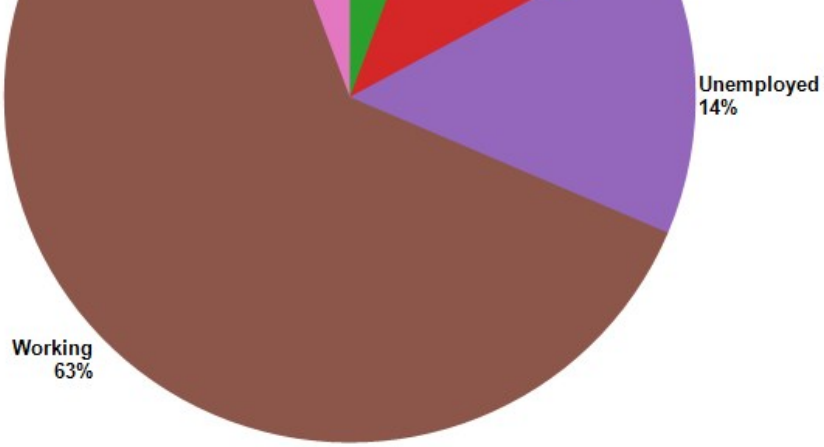
Destinations of Leavers from Higher Education (DLHE) 2011/12 (postgraduate taught graduates)

The DLHE survey is conducted 6 months after graduation.



Examples of employers

- Siemens
- Rolls Royce PLC
- Optical Performance Centre
- KPMG
- Microsoft Ltd
- King Edwards Consortium
- J.Sainsburys PLC
- Mondrago Investigations Limited



- Self employed
- NHS

Examples of occupations

- Software Engineer
- Trainee Clinical Scientist
- Technology Graduate
- Secondary School Teacher - Physics
- Research Analyst
- Nuclear Manufacturing Engineer Intern
- Musician
- Recruitment Consultant
- Internet Application Engineer
- Data Analyst

Further study - examples of courses

- MSc Astrophysics
- MSc Computer Science
- MSc Forensic Ballistics
- MSc Medical Imagery
- MSc Nuclear Physics
- MSc Physics and Technology
- MRes Chemical Engineering
- PhD Electronic Engineering
- PhD Physical Sciences

Visit the **Careers section of the University website (https://intranet.birmingham.ac.uk/as/employability/careers/college/eps.aspx)** for further information.

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