Astronomy and cosmology

Essentials

Taught programmes
MSc degrees
Astronomy
Cosmology

Research programmes
MPhil, PhD Astronomy

Related programmes
MSc in Particle Physics (p135)
MSc in Physics (p136)
MSc in Physics (EuroMasters) (p136)
MSc in Scientific Computation (p119)

Admissions requirements
For information on overseas qualifications that meet the admissions requirements, refer to pages 156-157
MSc
A first- or second-class undergraduate honours degree in a physics-, mathematics- or astronomy-based programme. Other degrees will be considered on an individual basis
MPhil and PhD
A first- or an upper second-class honours degree in a relevant subject: physics, astronomy or mathematics

English language requirements
IELTS 6.0, with not less than 6.0 in each section. Internet TOEFL with 90 overall, with 21 in Listening, 22 in Reading, 23 in Speaking and 24 in Writing. For more information and alternative English language requirements, refer to page 156

Fees
Refer to pages 158-159 for information on fees

Further information
Physics and Astronomy, PG Admissions, University of Sussex, Falmer, Brighton BN1 9QH, UK
E physpgadmiss@sussex.ac.uk
www.sussex.ac.uk/physics

- The Department of Physics and Astronomy was rated 12th nationally in the 2008 Research Assessment Exercise (RAE). 95 per cent of our research was rated as internationally recognised, and 60 per cent was rated as internationally excellent or higher.
- Sussex is ranked among the top 10 universities in the UK for physics and astronomy in *The Complete University Guide 2011-12*.
- The Department is a founder member of SEPnet, the South East Physics Network of physics departments, which in 2008 received a joint award of £12.5 million to enhance collaboration in graduate teaching and research.
- The Astronomy Centre carries out world-leading research in many branches of theoretical and observational astrophysics. Our particular focus is on the early universe, large-scale structure, the high-redshift universe, and galaxy formation and clustering.

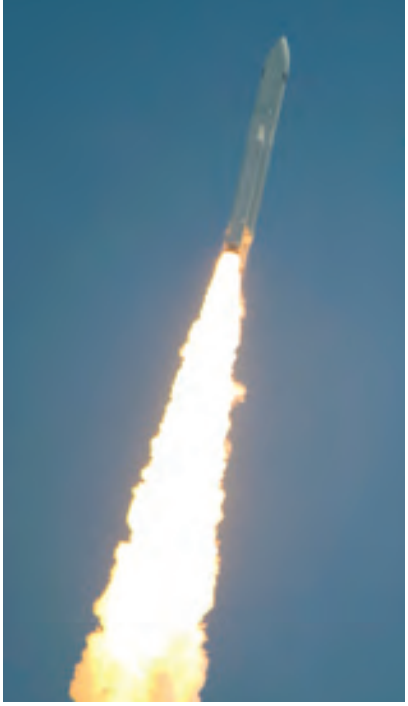
Taught programmes

MSc in Astronomy
1 year full time/2 years part time
The MSc programme is intended for honours graduates with an applied mathematics or physics-based degree who wish to learn how to apply their knowledge to astronomy. It is one of only three full-time, broad-based astronomy MSc degrees in the UK. It covers the major fields of astronomy and astrophysics at an advanced level, with an emphasis in the lecture courses on theoretical astronomy.

Teaching is by lectures, exercise classes, seminars and personal supervision.

Career opportunities
The programme has an excellent reputation, both nationally and internationally, and there are MSc graduates from the Sussex Astronomy Centre all over the world. Many of our graduates go on to take a research degree and often find a permanent job in astronomy. Others have become science journalists and writers.

Programme structure (full time)
Your time is split equally between taught courses and a research project. You have a supervisor who oversees your work in general and is responsible for supervision of your project. Supervisors and topics are allocated, in consultation with you, early in the autumn term. Projects may be theoretical, or involve simulation or data reduction. In many cases the projects form the basis of research papers later published in scientific journals.



The launch of the Herschel and Planck satellites from Kourou Spaceport in French Guiana in May 2009. Sussex is involved in both these satellite missions, which are the leading component of the European Space Agency's astronomy programme for the coming years

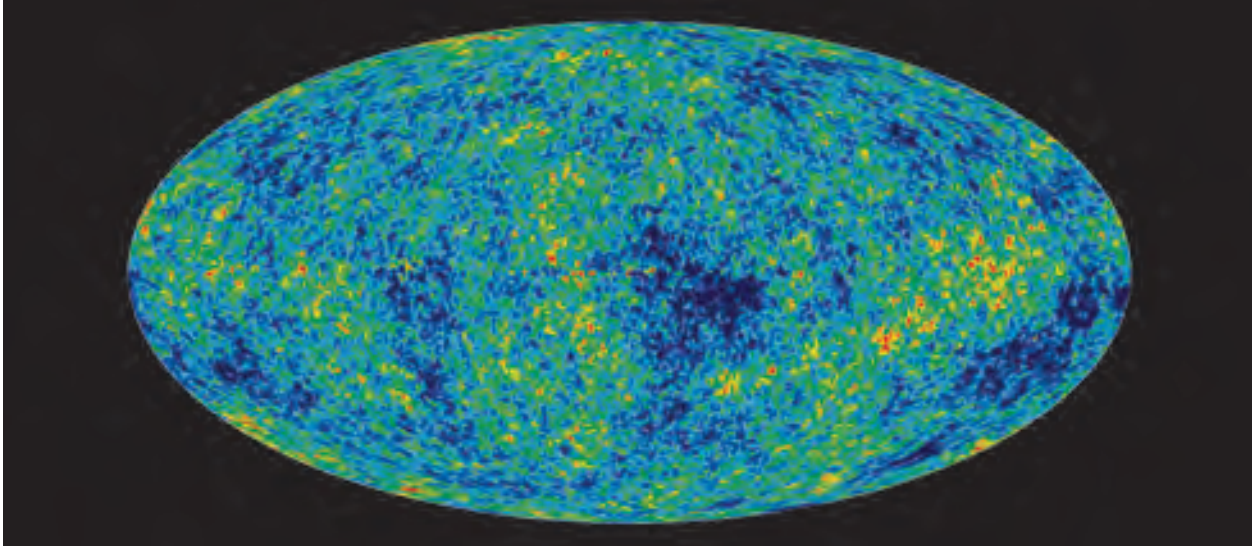
Autumn and spring terms: Cosmology • Galactic Structure • Stellar Structure (all three comprising 20 lectures and 10 problem classes) • Research Skills. You also choose two options from a range of courses available. These are taught on topics relating to research interests within the group, and vary from year to year, but generally cover a wide range of topics. Options might include Astronomical Detectors • Computer Simulations in Physics • Data Analysis Techniques • Galaxy Formation • General Relativity • Introduction to C. You start work on your project and give an assessed talk on this towards the end of the spring term.

Summer term: examinations and project work, including preparation of a poster presentation.

Programme structure (part time)
You take the four compulsory courses in the autumn and spring terms of Year 1. After the examinations in the summer term, you will begin work on your project. Project work continues during Year 2 when you will also take two options from the above list.

Assessment
Assessment for the taught courses is by coursework and unseen examination. Assessment for the project is by seminar, poster presentation and a dissertation of up to 20,000 words.

A distinction is awarded on the basis of excellence in both the lecture courses and the project.



Map of the cosmic background radiation, a relict of the Big Bang

MSc in Cosmology
1 year full time/2 years part time

The MSc programme is intended for honours graduates from an applied mathematics or physics-based degree who wish to learn how to apply their knowledge to cosmology. It is one of only two MScs in this subject area in the UK. The emphasis is on observational and theoretical cosmology in the pre- and post-recombination universe.

Teaching is by lectures, exercise classes, seminars and personal supervision.

Career opportunities

Most of our graduates have gone on to study for a research degree in a closely related field.

Programme structure (full time)

Your time is split equally between taught courses and a research project. You have a supervisor who oversees your work in general and is responsible for supervision of your project. Supervisors and topics are allocated, in consultation with you, early in the autumn term. Most projects are theoretical, but there is an opportunity for you to become involved in the reduction and analysis of data acquired by faculty members.

Autumn and spring terms: you take the two core courses Cosmology • Relativistic Quantum Fields I. You also choose four options from a range of courses available. These cover a wide range of topics relating to research interests within the group and vary from year to year. Options might include Early Universe • Further Quantum Mechanics • Galaxy Formation • General Relativity. You start work on your project and give an assessed talk on this towards the end of the spring term.

Summer term: examinations and project work, including preparation of a poster presentation.

Programme structure (part time)

You take the two core courses and two options in the autumn and spring terms of Year 1. After the examinations in the summer term, you will begin work on your project. Project work continues during Year 2 when you will also take two more options.

Assessment

Assessment for the taught courses is by coursework and unseen examination. Assessment for the project is by seminar, poster presentation, and a dissertation of up to 20,000 words.

A distinction is awarded on the basis of excellence in both the lecture courses and the project.

Research programmes

Coursework

You are expected to study a selection of MSc courses to ensure that you receive a broad education in modern astronomy, as well as training in research skills.

Observational projects for PhD students are likely to involve the use of overseas telescopes, and theoretical projects may involve the use of supercomputers.

Career opportunities

Our students acquire considerable skills in computing and data analysis, which they find an asset in obtaining employment after graduation. Many of our graduates go on to postdoctoral study and subsequent permanent academic positions. Other recent graduates have obtained jobs in finance, information technology and the NHS.

Specialist facilities

Theoretical astronomers have access to massively parallel supercomputers in the UK (Durham and Cambridge) and overseas. We also have our own network of high-performance UNIX workstations and servers, and a departmental computer cluster.

The Astronomy Centre has an excellent record for obtaining observing time on STFC and other overseas telescopes, such as the Anglo-Australian Telescope and the telescopes on La Palma in the Canaries and on Hawaii. We have extensive involvement in satellite projects, especially in infrared and x-ray. The Centre is also involved with the 4m Visible and Infrared Survey Telescope for Astronomy (VISTA) in Chile.

Academic activities

Both MSc and PhD students are expected to contribute to the weekly informal seminars, and are encouraged to attend research seminars.

PhD students have an opportunity to attend an international conference and give a paper on their specialist subject. Observational students normally make at least one observing trip to an overseas telescope each year.

Faculty research interests

Our research focuses on extragalactic astrophysics and cosmology. Our faculty's research interests are briefly described below. For more detailed information, visit **www.sussex.ac.uk/physics**

Professor David Axon is an astronomer focusing on the co-evolution of galaxy bulges, massive black holes and the physics and structure of active galactic nuclei exploiting multi-wavelength observations with telescopes.

Ilian Iliev uses supercomputer simulations to study the formation of large-scale cosmological structures, the cosmic dark ages and reionisation by the first stars.

Antony Lewis works on theoretical and observational cosmology. He is involved with analysing data from the Planck Satellite.

Professor Andrew Liddle works on a range of topics in theoretical cosmology and dark energy. He is involved in the Planck Satellite and the Dark Energy Survey.

Jon Loveday is an astronomer interested in observational cosmology, the nature of dark matter, and in galaxy formation. He participates in several world-leading optical and near-infrared galaxy surveys, including GAMA, SDSS, UKIDSS and VISTA.

Professor Seb Oliver is an astronomer researching the evolution of galaxies since the Big Bang. He undertakes surveys of the distant universe and leads the largest project on the Herschel mission.

Kathy Romer is an observational cosmologist specialising in the detection and study of x-ray clusters of galaxies. She is the principal investigator of the international XMM Cluster Survey project.

David Seery is a theoretical cosmologist working on the physics of the very early universe, and in particular the properties of the primordial density perturbation, which is believed to have seeded later structure formation.

Professor Peter Thomas uses supercomputer simulations to investigate the physics of galaxies and clusters of galaxies.

Parts of our cosmology research are carried out within the theoretical particle physics research group, whose faculty interests can be found under the Physics subject entry on page 135.