



University of Sussex

Outreach Programme 2015/16

for Schools & Colleges

Physics, Astronomy & Maths

University of Sussex

Contents

Overview of our outreach offerings.....	3
Primary Education.....	4
Secondary Education.....	5
AS & A2 Level Education.....	8
GCSE & A-Level Schools Labs.....	9
Research Talks in Physics, Astronomy & Maths.....	10
Our scheduled events.....	11
Contact Us.....	12



An Astronomy Experience day here at the University of Sussex

Overview of our Outreach Offerings

Our aim is to encourage more students to study Maths, Physics & Astronomy at A-level and beyond.

- All of our activities are free.
- Activities are located either on campus or in your school.
- All our activities link to the National Curriculum.
- Activities are available for all ages, from primary to A-level.
- Bespoke half and full day sessions are available, with multiple activities of your choice.
- All activities are presented by our trained and DBS cleared University staff and students.
- Please give us as much notice as possible when requesting an activity, as the calendar fills up quickly at some times of the year!
- We are flexible, so please let us know if you would like something that we do not advertise.



Primary students discovering infrared light with our thermal camera

Primary Education Activities in Physics, Astronomy & Maths

Hands on activities and demonstrations, exploring everyday phenomena from within the home to the entire Universe!

* Only available on campus



Inflatable Planets Workshop

Using our inflatable planets pupils can not only explore but be our solar system! From the order of the planets to orbits and gravity, your pupils can discover the key characteristics of our solar system.

'Hot and Cold' Day*

From running their own insulation experiment to using our thermal ducks, over the course of one day KS1 and KS2 pupils can discover the thermal physics of everyday life including conductivity, thermal radiation and much more!



Penrose Tiling

Students get to make their own mathematical shapes, explore symmetry, and make their own tiling patterns using tiles in the shape of darts and kites!

The Infection Game

Mathematics just got infectious! Play the infection game to study how infections spread from a single case to a blown pandemic.



Secondary Education: Physics

Aimed to inspire pupils through their GCSE's and encourage them to consider A-level physics and maths.

*Only available on campus

GCSE Taster Event*

Lasting half a day, year 9 & 10 pupils experience GCSE physics through hands-on experiments. Bookable at any time for large groups of 50 or more students, and on 22nd & 23rd June 2016 for groups of any size.

Radical Radio-activity

Explore the various aspects of radio-activity using Geiger counters.

Rollercoaster Physics

Investigate energy transfer, speed and velocity with K'Nex model kits.

Thermal Infrared Camera

A demonstration of the electromagnetic spectrum and light beyond the visible.

Rocket Workshop

Using solid fuel rocket engines, pupils can build and launch their own rockets.

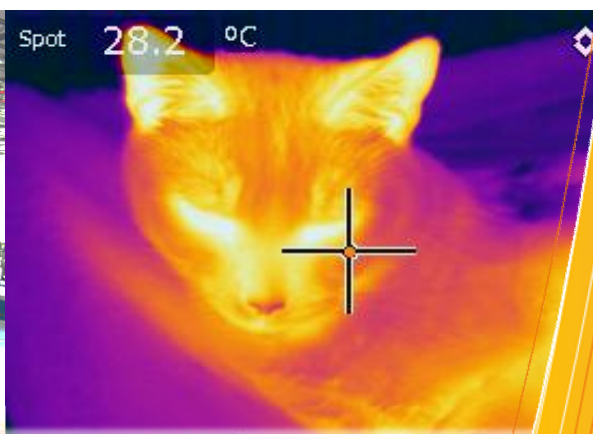
Particle Physics Masterclass*

A one day, annual event encompassing experiments, computer simulations, the "Accelerate!" show, 'Live from CERN/SNO+', research talks and discussion sessions. Dates for 2016 are July 6th for GCSE students.

Mini masterclasses are also available to individual school groups of 30 or more students which are bookable at any time.



GCSE Taster Event



Binky the cat in infrared

Secondary Education: Astronomy

*Only available on campus.

** Weather dependent.

Astronomy Masterclass*

Our astronomy masterclass, which can be tailored to your requirements and bookable at any time for large groups of 30 or more students, gives your pupils a full or half day forage into astronomy. For 2015, our Astronomy Masterclass Day will be on December 16th for GCSE students.

Guess the gas!

Pupils create their own spectrometer and use it to "Guess the Gas!", purely from the colours emitted by the various lamps.

Solar Observing**

Using our solar telescopes, pupils can study our nearest star.

Star Parties**

Use our telescopes to search the skies, whilst our astronomers take you through the sights. Available from November to February in late afternoon/early evening. We recommend this activity during a visible crescent moon. Off campus, smaller transportable telescopes are available.

Inflatable Planetarium

Take a tour of the Universe with our "We Are Astronomers" show inside our portable, inflatable planetarium!

Planetarium capacity per show is 30. We can bring it to your school or college for groups of 70 or more students.

Minimum space required is 8x8x4m.



Our inflatable planetarium



Star Party

Secondary Education: Mathematics

Magical Mobius Strips [10-45 minutes; KS3, 4 & 5]

Explore topology with surprising results in this hands-on activity!

The Monty Hall Game and Problem [10-45 minutes; KS4]

As seen on gameshows, students will play the game and investigate the maths behind it.



The Great Race [1 hour; KS4]

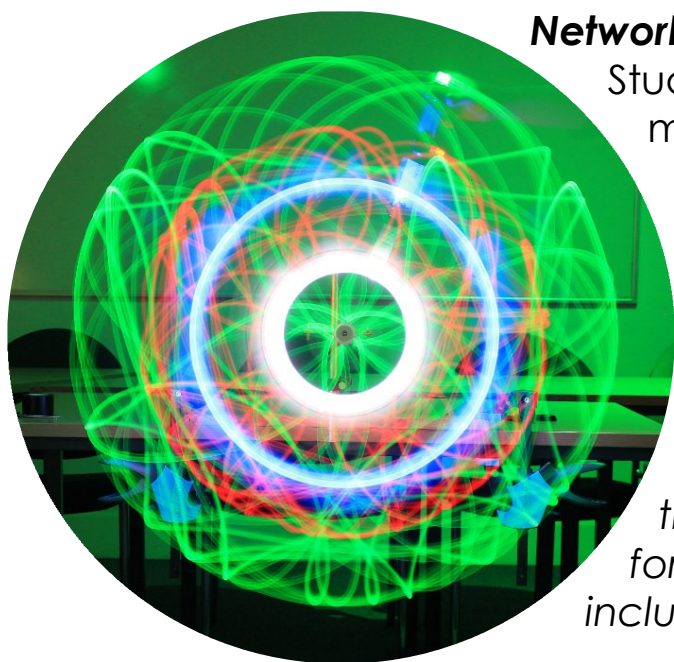
Through a game of horse racing, students learn or reinforce knowledge of probability and relative frequency.

The Maths of Card Tricks [1 hour; KS4]

Discover first hand the mathematics behind popular card tricks.

Networks and Zombies [1 hour; KS4 & 5]

Students will learn how to use mathematics (network theory) to avoid a zombie apocalypse!



Short demonstrations

[Up to 1 hour; KS 3, 4 & 5]

We have a collection of short 10 minute Maths demonstrations that can be put together to form a 1-hour round-robin event, including...

- **Geometrical Bubbles** - explore how bubbles of minimal surface area form with a variety of different shapes.
- **Chaotic Pendulums** – explore the Maths of double pendulums (pictured above)
- **How Many? Estimating Numbers** – How do you estimate the number of things you cannot actually see, like tigers left in the wild? This interactive activity introduces several methods for estimating numbers such as the Capture-Recapture method, which students try out for themselves using ping pong balls in a box!

AS & A2 Level Education

High-level activities to inspire and challenge your students.

*Only available on campus.

RESEARCH LAB TOURS*

See world-leading research in action, with a guided tour of one of our experimental research labs by a PhD-student researcher. Discover what new physics they are searching for and their educational path.

ASTRONOMY

Astronomy Masterclass*

Our astronomy masterclass for A-level students will be held on the 15th December 2015, with a range of activities and a chance for your students to talk directly to our astronomers about their latest research.

PARTICLE PHYSICS

Particle Physics Masterclass*

A one day, annual event held on the 5th July 2016 for A-level students, encompassing hands-on experiments, computer simulations, our "Accelerate!" show, 'Live from CERN/SNO+' telecon, research talks and discussion sessions.

Mini-masterclasses are also available for individual school or college group visits of more than 30 students. These are bookable at any convenient time and can be tailored to suit your needs for length and content.

Cloud Chambers

We have a collection of cloud chambers (to either build from scratch, self-assemble with dry-ice, or just flip a switch!) which allows students to see both alpha and beta radiation. Some of our cloud chamber activities are campus only.

CAREERS

We have careers talks that are presented by either our University of Sussex undergraduates, postgraduates or lecturers in physics, astronomy and maths. These talks are aimed at giving advice and information from applying to University to postgraduate employment.



Lego Quark colour-charge

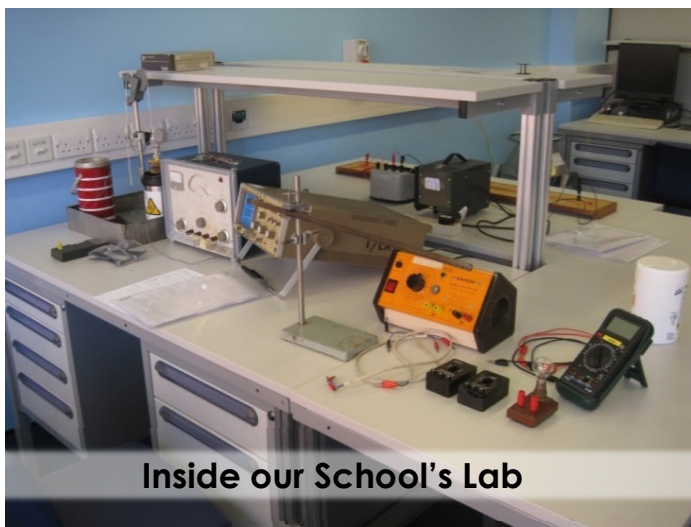


Particle Physics Masterclass

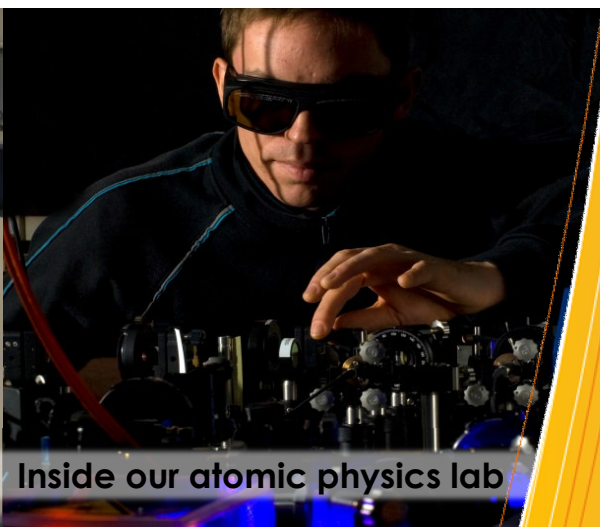
GCSE, AS & A2 level Schools Lab Day

Our popular schools lab programme offers;

- A full day (10am – 3pm) of physics experiments here at the University of Sussex.
- A set of experiments suitable for GCSE, AS or A2 students - all are designed to cover the relevant specification.
- Please see our website (address on back page) for a list of experiments. We can 'mix and match' on request.
- Bookable for up to 12 students, ideally 10.
- GCSE students receive a careers talk from one of our undergraduate or postgraduate students.
- AS and A2 students receive a research talk from one of our world leading researchers (a careers talk is available on request if preferred).
- Students receive a guided tour of one of our research labs, given by a PhD student.
- Held on Fridays, other days may be available on request.
- Due to high demand at certain times of the year, please book as far in advance as possible.



Inside our School's Lab



Inside our atomic physics lab

We offer a wide range of physics, astronomy and mathematics talks given by our world leading researchers, for the full list please visit our website.

Higgs Boson: A look beyond the media hype

By Dr. Iacopo Vivarelli

Did the Higgs Boson discovery really deserve all the relevance it had? After this talk, you will be able to judge for yourself.

Can you run the Universe backwards?

By Professor Philip Harris

Focusing on the Electric Dipole Moment (EDM) experiment, explore the asymmetry in the laws of physics responsible for the origin of all matter in the Universe.

Our place in the Universe

By Dr. John Gribbin

Multi-award-winning author and scientist John Gribbin takes you on an illustrated tour, from here to infinity, in 50 minutes.

Sending Secret Messages

By Professor James Hirschfield

The mathematics of sending secret messages in cryptography from their origin over 200 years ago to modern communication.

Soap bubbles, snow flakes & walking on water

By Dr. Omar Lakkis

Surface tension, the time evolution of surfaces and how walking on water can become a reality.

Synchronisation in technology and water

By Dr. Konstantin Blyuss

An introduction and discussion of how synchronization arises and its mathematical study.

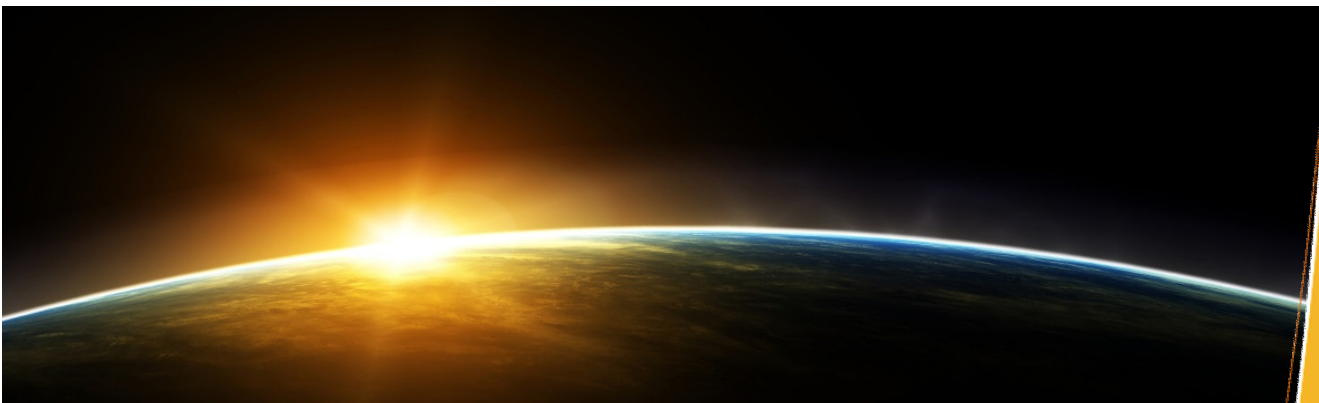
Careers

We have careers talks that are presented by either our University of Sussex undergraduates, postgraduates or lecturers in physics, astronomy and maths. These talks are aimed at giving advice and information from applying to University to postgraduate employment.

Our Scheduled Events

- *Schools lab: Fridays during the school term*
- *GCSE taster sessions: 22nd & 23rd June 2016*
- *Particle Physics masterclasses: 5th & 6th July, 2016*
- *Astronomy Masterclasses: 15th & 16th December, 2016*
 - *Teacher open evening: 19th July, 2016*
- *Monthly Institute of Physics & Sussex Universe evening talks - see our public events page at <http://www.sussex.ac.uk/physics/outreach/publicevents>*
- *Star parties available throughout the winter*

Please see our online calendar for exact dates at <http://www.sussex.ac.uk/physics/outreach/calendar>



The University of Sussex now offers outreach in a wide variety of other subjects, thanks to the **Widening Participation** initiative which is designed to ensure that all students, no matter what their background, will have the opportunity to go to University.

For full details, please see www.sussex.ac.uk/wp



Contact Details

Physics & Astronomy Outreach

physicsoutreach@sussex.ac.uk

<http://www.sussex.ac.uk/physics/outreach>

Mathematics Outreach

mathsoutreach@sussex.ac.uk

<http://www.sussex.ac.uk/math/outreach>

Or call: 01273 872815

To keep up to date with our latest offerings, and to receive updates on our latest activities, please send us your email address.

Please contact us for booking and confirmation of all events, as dates and activities are subject to modification.