



The University of
Nottingham

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Physics and Astronomy @Nottingham

School of Physics and Astronomy Newsletter 2016

**Here be Dragons...
...in their Den!**



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Welcome to the School of Physics and Astronomy

Going to university can be a life-changing opportunity, and we are pleased that you may be considering Nottingham among your choices, but it is important that you make an informed decision so you end up at the place that is right for you. We therefore provide many opportunities to help you in this process including pre-application University Open Days and post-application UCAS days, when we offer prospective students the chance to visit the school for tours of the teaching and research facilities, to experience university lectures and laboratory experiments, and, perhaps most importantly, to meet face-to-face with academic members of staff and current students. This newsletter is also intended to offer a little further insight as to what it is like to study here, to help you decide whether this is the place for you.

In this year's newsletter we catch up with two of our graduates who have embarked on exciting careers at the BBC and at RAL Space. We also celebrate the inaugural Thomas Farr Citizenship Prize, which officially recognises some of the important contributions our students make to the Nottingham physics community outside their more formal academic work. And finally, since the presentational skills that we teach our students are useful both as professional physicists and in the wider world, we were delighted to see these skills being put to the ultimate test by one of our former students making his pitch in the BBC's Dragons' Den.



Professor Michael Merrifield

In the School of Physics and Astronomy, we recognize the important interplay between teaching and research in giving our students the best possible education in cutting-edge physics. We were therefore delighted by both our continuing very strong performance in the annual National Student Survey of teaching excellence, and our tremendous result in the latest Research Excellence Framework, in which we were rated 2nd amongst all the physics departments in England, behind only Oxford.

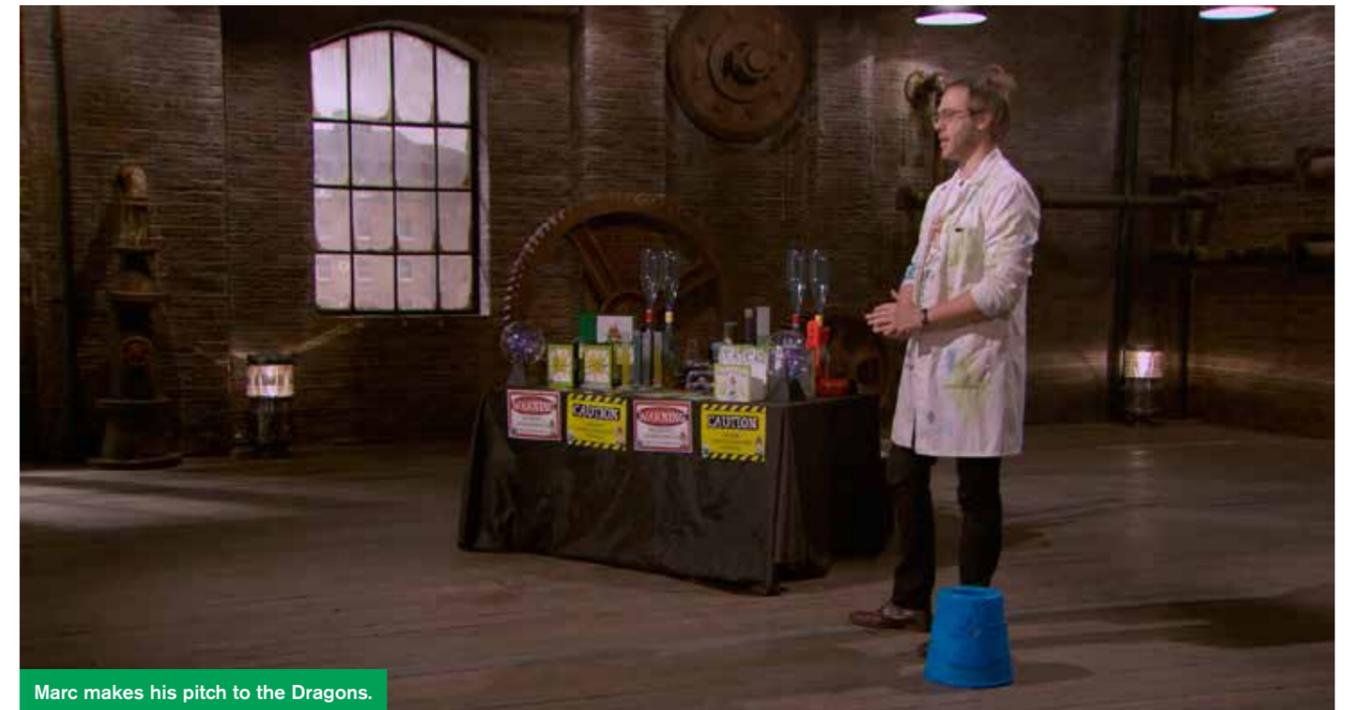
I hope you enjoy reading this newsletter, and I wish you every success in your studies, both at school and in whatever course you ultimately choose to pursue.

Professor Michael Merrifield
Head of the School of Physics & Astronomy

News

Breaking News

The School of Physics & Astronomy is delighted to report it has just been successful in its bid for £250,000 to undertake a major refurbishment of our undergraduate laboratories. The work will begin in April 2016 and be ready in time for the new academic year starting September 2016. Watch this space...



Marc makes his pitch to the Dragons.

Mad Marc enters the Dragons' Den

"I still can't really believe that I walked into the Den firing smoke rings at the Dragons and then made some slime. Doesn't seem like real life at all!"

'Mad' Marc Wileman graduated with his physics degree from Nottingham in 2007 and maybe his undergraduate training in presentation skills bore fruit as he impressively delivered his pitch on prime time TV in BBC's 'Dragons' Den' in August 2015.

Since graduation Marc has built his own company, 'Sublime Science', based on a brilliant idea; science parties for children. His events educate and entertain children who have the chance to get involved in fun experiments. After six and a half years it's a successful business, with turnover in the previous year of £793,000. With lots of orders on the books, Marc predicts turnover next year to rise to £1,200,000.

"Wow", The Dragons were seriously impressed. Marc has a healthy company, but he entered the Den to gain the investment that will enable him to sustain the growth and take the business to the next level.

Marc made a memorable start to his pitch, firing smoke rings at the five 'dragons' then explaining how he has entertained and educated more than 500,000 young children. In his lab coat that was full of character and had clearly seen plenty of action, he appeared every bit the eccentric scientist as he proceeded to make some slime on camera. Marc had combined presentational, educational and marketing skills immaculately in planning the visual and verbal aspects of his presentation. It couldn't fail to make an impact! Not only with the Dragons, but also as he discovered later, in the real world with people he met at ASDA, the local chippy and online!

Four Dragons were really keen and made impressive investment offers, but which would Marc choose? At times like this, when the nation is watching on TV, it helps to stand alone and talk to the wall. Which is what Marc discovered as he weighed up the options. Two Dragons teamed up to invest a total of £50,000 and the deal was done.

Marc later said, "I was so grateful for the incredible amount of support and positive vibes, it genuinely means the world to me". Good luck for the future Marc; awesome!

Marc's dramatic entry



"Heading into Dragons' Den is probably the most petrifying thing that I've ever done. It really was the nerve-wracking ordeal that I guess it's supposed to be".



Graduate Profile

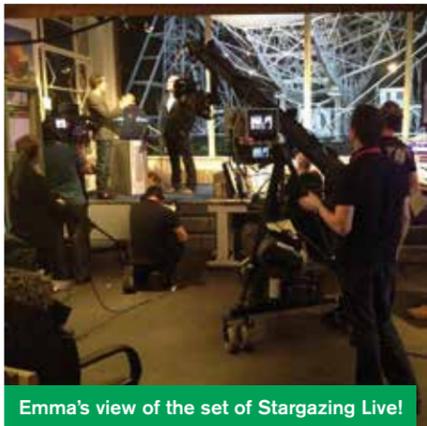
Emma Bradshaw at the BBC



Buzz Aldrin, moonwalker on Apollo 11, Dara O'Briain and Brian Cox



Emma's workplace may look familiar!



Emma's view of the set of Stargazing Live!



Emma during her interview with Walt Cunningham, Apollo 7 astronaut



Emma interviews Chris Hadfield, Commander International Space Station

In an earlier newsletter article, we reported on the success of Nottingham Astrophysicist Emma Bradshaw in her development of the award-winning 'Science Show' on University Radio Nottingham (URN). After graduating from Nottingham, Emma's training in physics and astronomy, coupled with her experience as programme controller at URN helped her to fulfil a longstanding ambition to join the BBC.

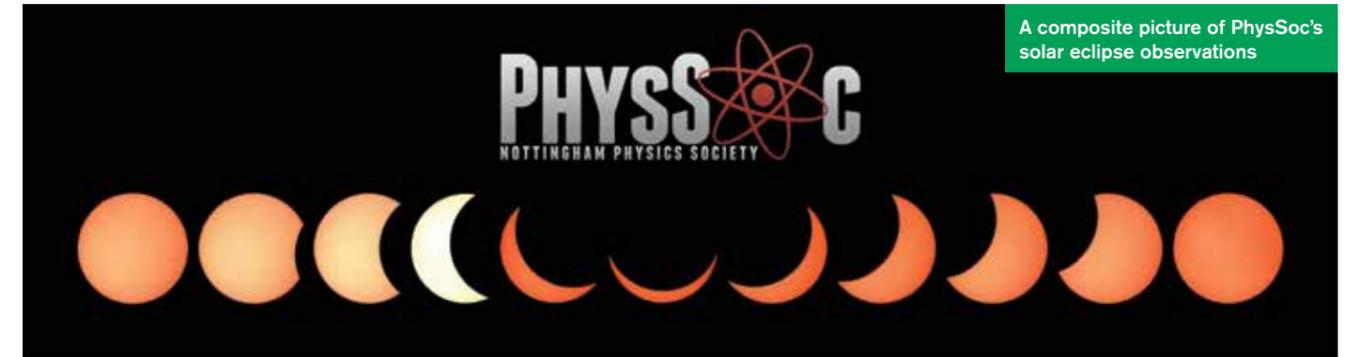
Having now worked in TV for a couple of years, we recently caught up with Emma to hear about her exciting new career. On joining the BBC she worked on BBC2 as a researcher, with a particular responsibility for developing material on the BBC's online and social media platforms. As she has gained experience and proved her abilities within the corporation, her job has evolved and she now enjoys a permanent appointment as Editorial Curator (BBC TV and iPlayer).

Emma's job has brought her into some exciting high-profile productions. Your newsletter editor was particularly envious when Emma spoke of her meeting with Apollo 11 astronaut Buzz Aldrin on the set of 'Stargazing Live' in 2015. As one of the first two humans to walk on the moon in 1969, here was a man whose name is destined to enter history alongside the most renowned ever to have lived. But in doing her job he is just one of the celebrities she has interacted with. In the 2014 edition of the programme, Emma had enjoyed the opportunity to interview Space Station Commander Hadfield and another Apollo astronaut, Walt Cunningham.

If you are watching other live BBC productions, Children in Need, Glastonbury, Radio 1's Big Weekend etc, then there's a good chance Emma will be part of the production team, developing live online content and running the social media accounts. Or in the quieter moments, it may be that she will be developing collections of material, choosing photos, prioritising content for the iPlayer or commissioning blogs linked to TV programmes, for example presenter Chris Lintott's 'Five top Sky at Night moments'.

Enjoy the photo gallery sent to us by Emma, which gives a flavour of her first couple of exciting years at the BBC.

PhysSoc broadcasts solar eclipse to the world



A composite picture of PhysSoc's solar eclipse observations

"We're absolutely thrilled about how many people tuned in to watch, with viewers all over the world!" reflected PhysSoc President, Kris Thobroe, speaking the day after our student physics society enjoyed national and international success with its live streaming of the 20 March 2015 solar eclipse on YouTube.

We get few opportunities in our lives to witness a solar eclipse, they are truly rare events. So we were thrilled when the day of the eclipse brought clear, uninterrupted blue skies over Nottingham and some of the best observing conditions in the UK. Kris and his team had prepared well for the event, setting up the School's Solar Telescope to track the sun throughout the eclipse. This apparatus, used regularly by our undergraduates in their astronomy practical work, is specifically designed to make high quality observations of the very bright object that is our local star.

There was tremendous excitement in the School of Physics & Astronomy as the time of the eclipse drew near. Staff and students alike congregated on the roof alongside our solar observatory. As the moon passed across the sun, the air cooled and there was an eerie sense to the dimming light which intensified our feeling of awe and exhilaration as we all witnessed this exceptional event. At Nottingham, 89% coverage was observed at maximum, viewed by many on the roof

with their own impromptu projection apparatus. One of the most successful was Dr Philip Hawker who projected the sun's image onto a cardboard screen using a refracting telescope obtained from a pound shop! But remember: Never, never, never observe the sun directly with your eyes!

PhysSoc's live stream was a tremendous success, watched by 234,721 YouTube viewers in 166 countries over the duration of the eclipse. This was a great social media hit; Kris later said "as we got closer and closer to the peak of the eclipse at 9.32am the views just kept rising as the stream was shared around online via local news and twitter. Our video image was shown in a number of schools where the weather was too cloudy to see the eclipse themselves". Hearing of the social media storm, the Independent and Mirror newspapers later requested some of the footage for their own web sites.



You can watch PhysSoc's video yourselves at <https://www.youtube.com/watch?v=Ty9SleWiOx8>

Look out for evidence of the sun's activity in the solar prominences that are also captured in the images from our impressive solar telescope.

Fact file:

- 234,721 live viewers
- Peak of 28,800 viewing at any one time
- Viewed live in 166 countries worldwide
- Total live viewing time on YouTube of 42,385 hours



The Nottingham solar telescope



Dr Hawker achieved a good image of the eclipse with his 'pound shop' telescope!

Space Systems Engineer Georgia Bishop

Preparing the MIRI (Mid InfraRed instrument), flight instrument for the James Webb Space Telescope for vibration testing in RAL Space's vibration test facility at the Rutherford Appleton Laboratory



Georgia working in the satellite development cleanroom



Georgia, no longer in disguise, is in her office analysing test data from a miniature particle radiation monitor using Matlab

"It takes a lot of effort to send something into space and it can so easily go wrong. Even if the instrument performs well and can be controlled up in space, it still needs to be able to survive the journey up there, as well as the space environment in which it will operate". Here Georgia Bishop is reflecting on her new role in the 'Space Engineering and Technology Division' of RAL Space. This leading organisation is located at the Rutherford Appleton Laboratory in the Oxfordshire countryside on a large campus that hosts some of the UK's most prominent, world-leading technical and scientific facilities. It's a stimulating and exciting place for a young scientist to work, where RAL Space sits alongside the Diamond synchrotron X-ray and light source, the ISIS neutron scattering facility, the central Laser facility and numerous other laboratories operating at the forefront of 21st Century science and technology.

Shortly after graduating in 2014 with her MSci degree in 'Physics & Astronomy', Georgia started her new job at RAL Space. Her Division is dedicated to building, testing and calibrating instruments for satellites, space probes and ground support stations. Georgia describes how, once the probe is in space, there is no second chance to make modifications to the design or hardware and the instruments must work faultlessly for many years. Therefore, meticulous care in the planning, design and construction means many projects take years to complete before the probes ever reach the Launchpad to start their working life.

"Currently I am writing a procedure for a test I will perform on a broad-band radiometer (BBR), which is going to sit on the EarthCARE satellite (ESA) to monitor clouds, aerosols and radiation in the atmosphere to better understand their contribution to global warming. The aim of this test is to verify the alignment stability of the instrument's feet". The photo shows Georgia preparing a dummy for the test on the probe's stand, an essential preliminary to developing the final trials that will be conducted using the

actual instrument that will eventually find itself in space. As with all space engineering, dust and contaminants must be strictly controlled at all times, and operations are continuously conducted in cleanroom conditions, which explains why Georgia appears 'in disguise'!

"System requirements are a list of specifications we need to meet for the instrument/system being built. As a systems engineer I take these requirements and split them into the different sub-systems (e.g. mechanical, thermal, electrical) so that the right people work on them. I will also decide how best to verify each requirement (e.g. test, inspection, computational modelling) and at what stage(s) in the project this will be done. It's basically managing the technical side of things and requires knowledge of all aspects of the design and making sure the sub-systems work together. Because of this, I also get involved in different parts of the technical work depending on my skills."

"A large part of this technical work consists of analysing instrument data. For example, I have recently used the MatLab software package to analyse test data from a miniature particle radiation monitor, in order to assess its performance. Extensively using MatLab over my 4 years at Nottingham, particularly using it for astronomical data analysis, has prepared me very well for this work. For the other aspects of the job my Physics degree has also been extremely useful."

"I'm about to start work as a systems engineer for a potential European Space Agency (ESA) mission candidate called ARIEL (Atmospheric Remote-Sensing Infrared Exoplanet Large-survey)." Clearly, after just one year in her new job, Georgia is enjoying the stimulating environment in which she works and the exciting opportunities it presents.

Kris wins inaugural Citizenship Prize

In recognition of his outstanding contributions to the life of the School, particularly his truly exceptional work as President of our Physics Society, PhysSoc, students and staff alike were thrilled when Kris Thobroe was awarded the inaugural Thomas Farr Citizenship prize when he graduated in July 2015. Here he is seen receiving the award from Head of School, Professor Merrifield.

Kris' achievements with PhysSoc have featured a number of times in this newsletter in recent years; in this edition, his work in organising the team that observed the solar eclipse, and in earlier years the launch of a weather balloon, and science visits to Amsterdam and CERN in Geneva are just some highlights in a regular programme of PhysSoc activities.



The Thomas Farr Citizenship Prize is awarded for outstanding contributions to the life of the School. Here Kris receives his award from Professor Merrifield.

Physics prize winners at the 2015 Graduation



Since graduation, Kris has enjoyed a gap year. Here we see him on his travels in Cambodia.

Physics & Astronomy in numbers:

2nd
in England in Research
Excellence Framework

93%
overall satisfaction in
National Student Survey

Ruler of the Universe



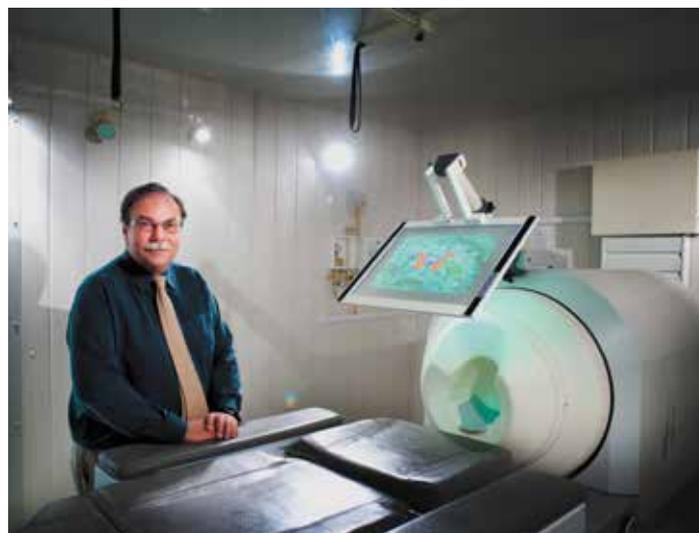
Scaling objects from the very smallest dimensions, the Planck length 10^{-35} m, right up to the very largest, the radius of the visible universe, 10^{26} m, our 'Ruler of the Universe' is proving to be very popular. If you would like to receive one free, please send your request to physics-enquiries@nottingham.ac.uk

Canoe Slalom World Champion... for the third time!



Congratulations to Nottingham Mathematical Physics graduate David Florence, who became World Champion in the individual C1 class Canoe Slalom in September 2015. This, his third World Championship gold medal, adds to silver medals at the 2008 and 2012 Olympics. The School continues to be very proud of his achievements and avidly follow his sporting career.

Prof Peter Morris awarded CBE in New Year Honours



The School of Physics & Astronomy was delighted at the announcement of a CBE (Commander of the British Empire) to our colleague Professor Peter Morris in the Queen's New Year's Honours 2016. Professor Morris is Head of the School's world-leading 'Sir Peter Mansfield Magnetic Resonance Centre'.

In fact Professor Morris was a young researcher working in the group of Sir Peter in the late 1970s - early 1980s when much of the pioneering MRI work was being conducted in our main Physics building, leading to Sir Peter's 2003 Nobel Prize award.

He was one of a small group of physicists who, on the eve of a major international conference in the USA, worked late into the night to produce the first pioneering image of the human body.

Since then, Professor Morris has worked with distinction in contributing to the teaching and research of our School, as well as contributing widely to the work of various important UK science bodies.

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