

Make it happen

Imperial launches pioneering
innovation and community space
at the White City Campus

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EDITOR'S CORNER

Onwards

Welcome back to *Reporter*. You may have noticed there's been a bit of a hiatus since the last issue at the end of June. We've been busy gathering lots of feedback and ideas on *Reporter* from you – the readers. We'll be launching with a refreshed *Reporter* in the new calendar year. We want to include more voices from our diverse community – whether you're a postdoctoral researcher, teacher, or chef – we'd like to help you write for us. It doesn't have to be a work of dazzling prose, we just want to get an insight into how our community ticks – What role do you do? What do you like at Imperial? What would make it better? In the meantime, we've got a great issue to tide you over with, focusing on some of the community-facing activities at Imperial's White City Campus, including the new Invention Rooms (centre pages) and an initiative to help boost digital skills among local elderly residents (page 4).

ANDREW CZYZEWSKI, EDITOR

Q *Reporter* is published every three weeks during term time in print and online. Contact Andrew Czyzewski: reporter@imperial.ac.uk



UK can be a world leader in drone tech, says Imperial academic at lab launch

The 'drone race' between countries is underway and the UK can be a leader, said an Imperial aeronautical engineer at the launch of a new centre.

Dr Mirko Kovac (Aeronautics) is the Director of the newly opened Brahma Vasudevan Multi Terrain Aerial Robotics Arena. The Arena is the first of its kind in Europe, enabling engineers to test the next generation of aerial robotics for urban environments and extreme conditions.



Dr Kovac said: "We see the UK at the forefront of a billion dollar aerial robotics industry, and new test facilities like the one we are opening today at Imperial will help the country to realise this ambition."

The researchers in the Arena can simulate different terrains in the air, the ocean and on land. The space also enables the engineers to create extreme conditions such as fire, smoke, and heat to simulate how the next generation of drones will perform in harsh environments.

"The applications are limitless. Imagine search and rescue aerial bots that could zoom out over rough seas to save lives, or deliver medicines to help those in emergency situations. We see aerial robotics as a way to improve all our lives," added Dr Kovac.

The development of the Arena is thanks to a £1.25 million gift from alumnus Mr Brahma Vasudevan (who graduated in Aeronautical Engineering in 1990).

Mr Vasudevan said: "I studied aeronautics at Imperial and I have a personal interest in drones, being a hobby of mine. A few years ago I was introduced to Mirko and his team and I was very excited to hear about how drones could have a positive impact on the environment, industry and our way of life. Now our shared vision is a reality and it is great to see the Arena open for research, teaching and industrial development."

Dr Kovac has also co-founded the London Robotics Network along with King's College London and the company Shadow Robots, with funding support from the government's Innovate UK, to develop a regional aerial robotics cluster.

—COLIN SMITH, COMMUNICATIONS AND PUBLIC AFFAIRS

TOAST

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Imperial launches search for enterprising women

From wearable light-sensors to prenatal fingerprick tests: Imperial's pioneering entrepreneurial programme searches for a new cohort of innovators.

WEInnovate, formerly known as the Althea-Imperial Programme, launched its latest search for Imperial's best female student innovators last month.

The programme, now in its fourth year, is designed to inspire a new generation of women entrepreneurs at Imperial. Open to all female students, it consists of a series of workshops, talks by business leaders, and one-to-one mentoring sessions to help participants develop their innovative ideas before pitching to a judging panel for the chance to win a £10,000 top prize, as well as runner-up awards.

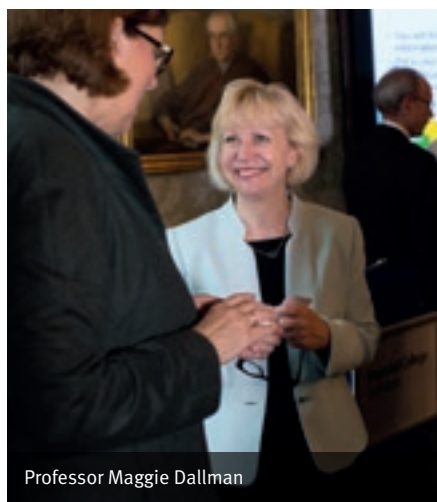
To mark the launch of this year's programme, previous participants of the programme were invited to speak to an audience of potential applicants at an event on Tuesday 10 October.

Opening the launch event, Professor Maggie Dallman, Associate Provost (Academic Partnerships) said: "We need to support women because businesses, companies and organisations must have a diversity of thinking, ideas and skills."

Speakers also included Christina Peterson, a finalist in the 2016 programme, whose company Lys recently launched a £40,000 crowdfunding campaign.

"I definitely wouldn't have this company if it weren't for the programme. To begin with it was just a creative university project – I didn't consider it from a business perspective at all. The programme made me look at it through a business lens, and helped me figure out the right route to take."

—DEBORAH EVANSON,
COMMUNICATIONS
AND PUBLIC AFFAIRS



Professor Maggie Dallman



Diplomats and scientists debate future of smart cities

A networking event at Imperial earlier this month brought together diplomats from some of Imperial's top collaborating countries including the USA, Singapore, France, UAE and Israel, and industry experts to find out more about the College's world-leading research.

Professor David Gann, Imperial's Vice President (Innovation) and Professor Maggie Dallman, Imperial's Associate Provost (Academic Partnerships) opened the event.

Professor Gann had just concluded a five-year term as Chair of the Smart London Board, working for the former Mayor Boris Johnson as well as the current Mayor Sadiq Khan to

realise London's potential as the world's leading smart city with first-rate digital infrastructure.

Professor Jennifer Whyte, from the Faculty of Engineering, outlined her work developing next-generation tools for engineers and managers to better integrate civil infrastructure projects. She explained the importance of 'screen real estate' when analysing data and highlighted how Imperial's 'walk-in screen' at the Data Science Institute is benefitting research.

Professor Whyte said: "Infrastructure complexity is growing and the speed of change is really challenging us."

—STEPHEN JOHNS AND JENNIE RAWLING,
COMMUNICATIONS AND PUBLIC AFFAIRS

in brief

Power-up

The College has established a new Research Computing Service (RCS), providing enhanced support and training for Imperial researchers. The Service is the successor to the High Performance Computing (HPC) Service, and continues to provide access to powerful, high-end computing resources, free at the point of use for the College's academic community. Led by new RCS Manager Matthew Harvey, the team will provide support for colleagues across the research computing spectrum, from beginner to expert, and desktop to supercomputer to Cloud. Another new appointee, Director of Research Computing Professor Spencer

Sherwin, is also now in post, providing academic leadership in the important and rapidly developing area of computational research.

Emerging picture

The plumes of pollution from London and seven other regions in Europe have been tracked and analysed thanks to the help of Imperial undergrads. The pollution monitoring was part of a larger project to analyse the situation across Europe and its major pollution centres. The team, including students Rhidian Thomas and Rachel Wu and supervisor Dr Jonathan Murray, spotted some long-range transport of

particles across Europe, and are now analysing the full dataset. To model pollution from major cities, scientists need accurate measurements to base their models on. The EMERGe project (Effect of Megacities on the Transport and Transformation of Pollutants on the Regional to Global Scales) has been gathering direct measurements of city pollution to help in this effort.



Rising star

Dr Cristina Lo Celso has been announced as the winner of the Foulkes Foundation Medal 2017, awarded by the Academy of Medical Sciences. The Foulkes Medal is awarded every two years to a rising star within UK biomedical research for contributing important and significant impacts to the field before, or in, their first independent position. This year's winner, Dr Lo Celso from the Department of Life Sciences at Imperial, uses advanced microscopy to study how leukaemia (cancer of the blood), develops, relapses and impairs healthy blood production.

Diversity in leadership discussed at Black History Month event

Social entrepreneur and political campaigner Samuel Kasumu spoke at Imperial to mark the thirtieth anniversary of Black History Month.

Samuel has leadership roles in various organisations, including Elevation Networks, a charity he started at the age of 19 which focuses on tackling gender and race inequality within the workplace.



Samuel's keynote lecture looked at the multi-ethnicity of Britain, the Grenfell disaster, and representation – before inviting audience members to ask questions and engage in a discussion about what more needs to be done.

Talking about the corporate world Samuel said: “Clearly we have made good progress, but whether or not it is sufficient is up for debate. This is probably the first time in history in Britain that people who have influence are saying, why does your board look that way?”

One audience member asked Samuel what institutions like Imperial could do to improve diversity within the staff and student body. As well as looking at recruitment practices, he also recommended focusing on how talent is progressed from within.

“How do you engage as an employer or an organisation committed to diversity? “There is always a business case for diversity. It is not just the right thing to do, it makes business sense.”

Samuel also spoke about the need to encourage people from underrepresented backgrounds to apply to university. When applying to university himself, he gained a place to study business and management at Imperial but turned it down. “I went to visit and I felt like none of these people remind me of me.

“There is still a hearts and minds challenge within higher education. If you look at a particular place and there's nobody who looks or sounds like you, we shouldn't expect people to just have the confidence to apply. There needs to be a way that students feel comfortable putting themselves forward for those institutions.”

— JENNIE RAWLING, COMMUNICATIONS AND PUBLIC AFFAIRS

Imperial invests £8m in childcare support for staff and students

Imperial has committed £8m to increase the number of nursery places available and improve existing facilities.

Imperial's Early Years Education Centre (EYEC), one of the largest workplace childcare facilities in London, currently provides day care and education for 158 children (aged between six months to five years) of Imperial staff and students each day. Full time and part time places are available, to enable parents to work flexibly, supported by the College's family friendly benefits.

The £8m investment will expand the EYEC's capacity, creating an additional 56 places – as well as completely refurbishing the existing indoor and outdoor space.

Professor James Stirling, Imperial's Provost, said: “As a world-leading university, Imperial has a longstanding commitment to help staff and students balance their working life with bringing up a family. This investment will expand our nursery provision, enabling us to support more members of our community.”

The College has been reviewing childcare provision for its entire community, and the focus at this stage is on the long-established EYEC, located on the South Kensington Campus. All staff and students

are eligible to apply for a place at the EYEC, regardless of their role or campus base. Imperial offers support with EYEC fees in the form of a salary sacrifice scheme.

Imperial's White City Campus has also been a key focus area in terms of future planning. The College is working directly with parents due to move to the College's White City Campus over the next few years to consider support in terms of transport and EYEC opening hours, until a permanent facility at White City is in place. The EYEC team is also engaging with nurseries based around Imperial's other campuses to explore options for access for Imperial staff on preferential terms.

The EYEC was classed as Outstanding in its most recent Ofsted rating, with the report noting that children there make ‘exceptional progress’. All staff working directly with children have specialist training.

— ELIZABETH NIXON, COMMUNICATIONS AND PUBLIC AFFAIRS



Students teach digital skills to the elderly

‘What the Tech?’, a digital literacy programme founded by Imperial students, is inviting residents to get help with their computers and gadgets.

The tech drop-in sessions are run by Hannah Magdziarek from the Dean's Office at Imperial College Business School, in collaboration with Helen Rowe of the Urban Partnerships Group and the Edward Woods Community Champions. Student and staff volunteers are jointly delivering the programme.

At the weekly sessions, held at the Edward Woods Community Centre, elderly

members of the local community can bring along their electronic devices – such as smartphones, tablets and laptops – to get help and support from Imperial's student volunteers. Students can help with a range of different skills, from how to send photos and create videos, to how to download apps, as well as advising residents about how to be safe online.

Mobeen Iqbal, volunteer and Doctoral student at the Business School, explains: “What The Tech?! has been a fantastic opportunity for students to step out of university and give back to the community.

— DAN WEST



media mentions

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The potential for farmed fish to feed a growing global population

BBC RADIO 4 ▶ 24.10.2017

Professor Ben Halpern (Life Sciences) spoke on *BBC Radio 4* programme *Costing the Earth* about the potential to move farms into deeper waters. “A lot of the aquaculture that’s happening in the ocean is right along the coastline... and that’s producing quite a lot of food already. But if you look just off shore a little further, there’s vast ocean space for growing fish and shellfish, and our study has looked at where that potential is, how much it is and how much food it could produce for people around the world.”

Hackers can make your pacemaker kill you – the NHS needs to respond

THE INDEPENDENT ▶ 01.11.2017

Writing in the *Independent*, Professor the Lord Darzi (Surgery & Cancer) discussed the digital threat to the NHS, framed around the recent WannaCry virus attack. “So far, attacks on healthcare have been principally for financial gain. But we have to face the prospect that they could, intentionally or otherwise, cause direct, physical harm,” writes Professor Darzi.

The exodus of EU citizens will happen in 2018

NEW STATESMAN ▶ 30.10.2017

If you work in science, academia, the NHS or other public services, you may have already noticed that EU citizens are leaving the UK in their thousands, Dr Giorgio Gilestro (Life Sciences), a teacher and researcher in neuroscience at Imperial, arrived in London seven years ago. “Brexit changed things,” he told the *New Statesman*. He says now some of his son’s European classmates are leaving and his own family’s deadline is set for March 2018.

Women who have regular glass of red found to be more fertile

THE TIMES ▶ 28.10.2017

Independent experts said the new findings had to be handled with caution. Dr Channa Jayasena (Medicine), clinical senior lecturer at Imperial and a member of the British Society for Endocrinology, told the *Times*: “There is a lot of interest in whether antioxidants could improve fertility in men and women. It is tempting to tell women to rush out and drink red wine, which contains antioxidants, but this study does not support that.”

Will the World’s Most Worrying Flu Virus Go Pandemic?

THE ATLANTIC ▶ 19.10.2017

H7N9 has evolved, acquiring mutations that allow other flu strains to reproduce more effectively in both birds and mammals. It has started killing birds. “Clearly this is a virus that we don’t want to become any more transmissible between humans,” says Professor Wendy Barclay (Medicine) told the *Atlantic*. “But it’s not already transmissible enough to cause a pandemic—otherwise, we would have seen one.”

awards and honours

COLLEGE

Green fingered start-up

A postgraduate student start-up focused on the horticulture industry has claimed first prize in the White City Incubator Innovators’ Programme. Delivered in partnership with NatWest, the Innovators’ Programme gives tech start-ups free access to state of the art office and laboratory space, mentorship and training whilst working in close proximity to Imperial academics and industry experts. The top prize was

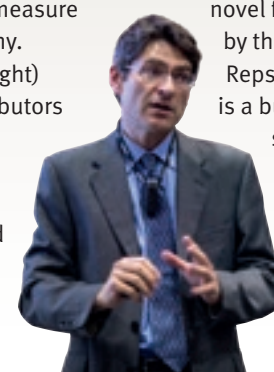
won by Phytoform Labs, a start-up founded by Imperial postgraduates Will Pelton, Nicolas Kral and Petra Kozmova, which aims to work with horticultural breeders to cut down plant breeding times from decades to years using new gene editing technologies. This will maximise yields for breeders and improve the economics of breeding for customers.



BUSINESS SCHOOL

Measure of worth

An economics expert from the Business School is one of the winners of a prestigious prize worth £125,000. Jonathan Haskel, Chair in Economics at the Business School, is one of the winners of The Indigo Prize. This is a new economics prize that celebrates radical and creative thinking in how to measure the modern economy. Professor Haskel (right) led a team of contributors whose proposal is to extend GDP to measure intangible and free goods, and also to measure the welfare of societies.



ENGINEERING

Energizer

A team of Imperial academics including Professors Nigel Brandon and Anthony Kucernak and Drs Javier Rubio Garcia, and Vladimir Yufit, have won an award from Spanish energy giant Repsol for their new company RFC Power, which is based on their research into novel flow batteries, funded by the EPSRC. The Fundación Repsol Entrepreneurs Fund is a business accelerator that supports the talent of innovative start-ups in the fields of energy and mobility. Business projects receive up to 144,000 euros per year.

World's first 3D printed steel bridge will be a 'living laboratory'

Imperial researchers are part of a team testing a 3D printed footbridge due to be installed across a canal in Amsterdam in 2018.

The team, led by The Alan Turing Institute and 3D printing company MX3D, will measure, monitor and analyse the performance of the 12 metre-long stainless steel bridge, which will be the world's largest 3D printed metal structure.

About a third of the bridge has already been printed in a lab in the Netherlands, and it is due to be installed in late 2018. It will cross the busy Oudezijds Achterburgwal canal in central Amsterdam, and will be open to pedestrians and cyclists.

A vast sensor network will be designed and installed on the bridge by a team of structural engineers, mathematicians, computer scientists and statisticians working in The Alan Turing Institute-Lloyd's Register Foundation programme in data-centric engineering. The programme is led by Professor Mark Girolami (Mathematics).

The sensors will collect data on structural measurements such as strain, displacement and vibration and measure environmental factors such as air quality and temperature, enabling engineers to measure the bridge's 'health' in real time and monitor how it changes over its lifespan.

Professor Girolami said: "This data-centric, multidisciplinary approach to capturing the



The bridge is created by a 3D printer

bridge's data will also mark a step-change in the way bridges are designed, constructed, and managed, generating valuable insights for the next generation of bridges and other major public structures.

The data from the sensors will be inputted into a 'digital twin' of the bridge: a living computer model developed by the Steel Structures group in the Department of Civil and Environmental Engineering.

The digital twin will imitate the physical bridge with growing accuracy in real time as data from the sensors comes in. The performance and behaviour of the physical bridge can be tested against its digital twin, which will provide valuable insights into designs for future 3D printed metallic structures.

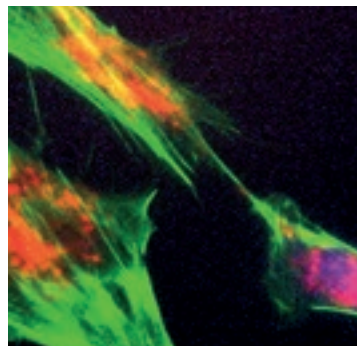
—HAYLEY DUNNING, COMMUNICATIONS AND PUBLIC AFFAIRS

Breathe easier

Early stage trials have shown promise for a cell-based therapy for treating lung tissue damaged by respiratory diseases.

In a collaboration between Imperial and Hong Kong University (HKU), scientists have shown that the stem cells can reduce some of the damage seen in human lung cells exposed to cigarette smoke in the lab, as well as reducing similar effects in the lungs of mice.

Further trials will be needed but according to the researchers, the findings could pave the way for a cell-based therapy for patients with chronic lung



diseases like COPD and asthma.

COPD (Chronic obstructive pulmonary disease) is a severe respiratory condition largely linked with cigarette smoking. In patients with the condition, the gradual stiffening of tissue and loss of fine structure leads to a drop in the overall volume

of the lung, making it increasingly difficult for them to breath.

The team cultured human smooth muscle cells of a type similar to those found in the airways and lungs. The cells were subject to oxidative stress, mimicking the effects of respiratory illnesses and smoking, and some were then injected with stem cells (bottom right, pink). This seemed to counter the effect of the stress in several measures including apoptosis (programmed cell death).

The stem cell treatment was also effective in relieving symptoms in a mouse model of respiratory disease.

Dr Pank Bhavsar (NHLI) corresponding author of the paper, said: "Within 24 hours of giving the stem cells to the mice we observed an improvement in lung function, so we know that even though very few cells are getting to the lung they are still having an impact.

"In future we might have the ability to re-colonise those areas which have been damaged by disease and reverse the destruction that has occurred. At the moment, the evidence we have is more to do with the interaction between diseased cells and mitochondria, which may have a therapeutic benefit."

—RYAN O'HARE, COMMUNICATIONS AND PUBLIC AFFAIRS



“ This could revolutionise the way information is analysed and transform many different fields of research – making computer networks virtually hacker-proof.”

Quantum computing breakthrough: Imperial scientist reveals latest findings

A materials expert Dr Jonathan Breeze (Materials) says quantum computers may be able to come out of the cold, thanks to his research breakthrough.

What is quantum computing?

Quantum computers offer the potential to carry out computing operations in parallel, which could rapidly speed up computations.

What are the potential benefits of quantum computers?

They could revolutionise the way information is analysed and transform many different fields of research including drug discovery and cryptography – making computer networks virtually hacker-proof.

How do quantum computers differ from conventional computers?

The major difference between a conventional computer and a quantum computer is the way in which they store and process information. Quantum particles have a physical property called 'spin', similar to a magnet with a north and south pole, which can be manipulated to process information. Exploiting the spin of a quantum particle enables information to be processed in a completely different way to standard computers. For example, conventional

computers use either a 0 or 1 as the basis for processing information. In quantum computing, information can be stored as a 0 or 1, or both simultaneously. This phenomenon is known as superposition and essentially enables this powerful, parallel processing ability.

Another signature of a physical system's ability to function as a quantum computer is the observation of quantum Rabi oscillations since they enable the reading and writing of quantum information to be carried out.

What are their limitations?

At the moment, quantum computers can only operate at cryogenic temperatures – one hundred times colder than deep space at roughly minus 270 degrees Celsius. As a consequence, these computers can only process a few qubits. Warming things up creates a different problem in that the qubits get disturbed by their environment. This quantum noise gets worse the higher the temperature becomes, hence the need for cryogenic cooling.

How has your research overcome this limitation?

We used maser technology, essentially a microwave laser, to produce quantum Rabi oscillations at room temperature. Specifically, we used an organic molecular crystal, a dielectric resonator and pulse of laser light to produce pronounced Rabi oscillations at microwave frequencies, lasting up to ten microseconds (ten one-millionths of a second). In quantum computing terms that is a long time, in theory allowing those important parallel computing processes to take place.

What is the significance of your research?

This discovery paves the way for room-temperature quantum information processing devices that have spin memories. A spin memory is a device that can store quantum information for a length of time using 'spins' which can be thought of as particles behaving like magnets with a north and south pole.

—COLIN SMITH, COMMUNICATIONS AND PUBLIC AFFAIRS

Make it happen

Imperial launched its pioneering innovation and community space with a free public event at the White City Campus last month.

The Invention Rooms – the first facility of its kind in the UK – represents a new and unprecedented approach to community engagement and outreach, combined with cutting-edge research and innovation all under one roof. It will bring members of the local community together with Imperial’s academics, students, alumni and partners to test out creative ideas, build real prototypes and share in the fun of making and discovery.

Based within The Invention Rooms, the Reach Out Makerspace provides local young people with free hands-on experience of designing and prototyping (see Unlocking talent box).

Professor Maggie Dallman, Associate Provost (Academic Partnerships) said: “The Invention Rooms will be a beacon for community-driven innovation - channelling the energy and ambition of our neighbours and bringing local people together with Imperial staff and students to share in the excitement of science, discovery, and making.”

The Invention Rooms also provides a new base for the College’s 2,500 strong network of entrepreneurs and inventors from the Imperial College Advanced Hackspace (ICAH).

“We are determined to make the Hackspace one of the best places in the world to turn an idea into a reality.”

The new Advanced Hackspace workshop at The Invention Rooms, situated next door to the Reach Out Makerspace, provides Imperial staff and students innovators with access to specialist prototyping and manufacturing equipment as well as a fully equipped bio-lab, which enables synthetic biology and molecular fabrication (see Enabling Innovation box).

Professor Oscar Ces, Hackspace board member, said: “We are determined to make the Hackspace one of the best places in the world to turn an idea into a reality. The new facility at The Invention Rooms will further strengthen the support we provide for our unique community of makers, hackers, inventors and entrepreneurs. It will be a serendipity engine – stimulating interaction and collaboration not just across the College, but also with external partners, SMEs, industry, and the local community.”

The Invention Rooms will also house a public events space, which aims to connect the community with the College’s research. Opening in spring 2018, the Interaction Zone will host a dynamic programme of events, activities,



Unlocking talent

Kate Mulcahy,

Makerspace Programme Coordinator

How did you get involved in the Makerspace?

I’ve been with Imperial’s Outreach team for six months now. Before that I worked on Royal Institution’s outreach programme, including the Christmas Lectures. I’ve also worked at the Science Museum and I taught at primary and secondary schools. I’m not a trained engineer, but I’ve always been interested in making – a tinkerer in the purest sense. I don’t believe in elitism in making.

The Makerspace is quite a significant development for Outreach isn’t it?

It is. The focus of Imperial’s outreach to date has been on raising attainment and participation in STEM subjects. The Makerspace programmes are more open-ended and community-focused in their aims. We want to create a space and suite of activities where the students can develop their skills and confidence in making. That might well lead to university, an apprenticeship or some entrepreneurial venture.

What will be the first initiative?

We are running a 12-week Maker Challenge

Programme for 14-18 years-olds from schools in the local area. There are 20 pupils in our first cohort. We held two, full-day intensive Saturday sessions earlier this month, where we did lots of training in ideas generation. Then they come in once a week on a Thursday from 4.30pm to 7.30pm for crash courses in using the equipment and machines – for example in woodworking, Computer Aided Design (CAD); laser cutting, 3D printing and more. After the training there will be three open sessions when they can develop their own project.

How have they found it so far?

Fantastic overall. Some of the students are now starting to think about their final projects and we have some diverse and ambitious ideas. One student is working on a prototype fire safety system where foam is ejected from the base of the tower allowing people to jump to safety. It was a direct response to the Grenfell tragedy.

What would be the long-term vision for the Makerspace?

Ultimately, we’d like to be a sort of ‘making library,’ where people can visit and use the equipment more freely. We’ll be developing our large interaction zone for the community (which is joined to the Makerspace) and once we get the community in there, we can find out what they actually want in terms of making aspirations.





Enabling innovation

Larissa Kunstel-Tabet,
Advanced Hackspace Fellow

You've had an interesting career in engineering to date and a long association with Imperial. Tell us more.

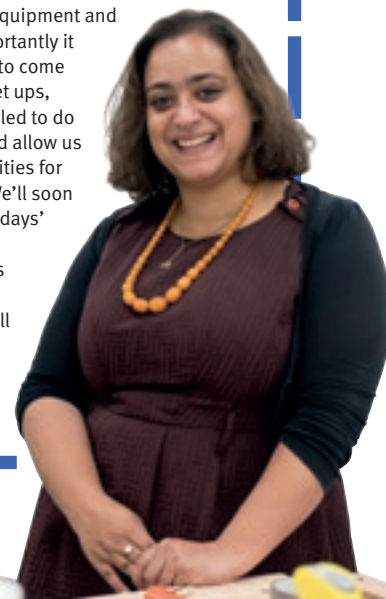
I think I've always had a passion for making things – and fixing them. My first proper job after school was a year in industry working, upgrading the London Underground rail network. I've worked for the BBC, on Dara Ó Briain's Science Club and was also a Technical Project Manager for a fashion technology company. We made dresses for Lady Gaga – one had flowing LEDs that looked like veins and pulsated to the music. I graduated from Imperial Mechanical Engineering in 2010, then completed my masters in Innovation Design Engineering in 2012. I came back to Imperial in January 2014, gearing up for the formal launch of the Advanced Hackspace later that year.

What was it like in the early days of the Advanced Hackspace?

Well in 2014, Dr Nick Jones and Professor Peter Childs had just secured a £380,000 EPSRC Award, to create the Hackspace; but we had no secure space, no office and no real equipment! There was a lot of talking with different Departments... and basically begging – 'please can we put a printer in this corner of your workshop?' What we were trying to create was unified spaces, where staff and students from say the biological sciences could go and use engineering workshops, or conversely engineers to use wet labs. Since then the Advanced Hackspace has grown wonderfully. We have a phalanx of good spaces and facilities around South Kensington and now the new Invention Rooms at White City; a community of over 2500 members of the Hackspace; six Hackspace Fellows; academic and student champions; and Hackers in Residence.

How will having the dedicated space at The Invention Rooms help things?

I think it will be transformative. Of course, it has some top-notch equipment and facilities, but most importantly it will allow larger groups to come together for regular meet ups, something we've struggled to do at South Kensington and allow us to offer co-location facilities for our external partners. We'll soon be launching 'HackMondays' at the Invention Rooms, where we'll get the tools out and make until late. The Invention Rooms will also be a step change for our already successful hackathons.



With over 2,500 members, the Imperial College Advanced Hackspace has grown to become one of the largest networks of makers and innovators within any university in the world.

The Invention Rooms and Reach Out Makerspace programmes are generously supported by The Mohn Westlake Foundation, The Berkeley Foundation, Garfield Weston Foundation, The Elsevier Foundation and Higher Education Funding Council for England (HEFCE).

Healthy legacy

Professor Gavin Screaton moves on after 14 years of world-class medical research and leadership at Imperial

What was it about Imperial that attracted you and made you stay here?

The Medicine Chair I took up in 2004 was an exciting new opportunity for me and created some space for me to really develop, in terms of managing things and exploring new horizons. I think it's fair to say that Imperial College owes me very little and I owe Imperial a lot. I came here with the management skills to run a laboratory of ten people and Imperial has taught me the rest of it, and given me the opportunities to develop, to try new things and put ideas into practice. That's one of the special things about Imperial, it is not frightened of good ideas, not frightened of change, and it gives people opportunities. Come up with a good idea and people will listen to you here.

In addition to your leadership responsibilities, you've remained very active publishing research. You must still have that passion for your field of work?

That's the one thing that's not negotiable. I get a lot of enjoyment out of research and it keeps me ticking. It is something that I couldn't really give up and I've been very lucky at Imperial to continue that. Of course, the leadership roles have constricted my research to a degree, and my interests are much less broad than when I was more dedicated to research, but we've focused more tightly on dengue and now Zika virus – and if anything that's become more successful than it's ever been.

Do you think that scientists are getting more of a grip on these very clever viruses or will they always be one step ahead?

I think we're catching up in terms of understanding them, the difficulty is that there will always be new ones wanting to make a jump from animals into humans and the evolutionary arms race is very much with us. If you put a pressure on a microorganism it will try desperately to run away, whether that pressure is a new vaccine, a new drug or an antimicrobial agent. So I don't think this is going to go away; as molecular virologists, I don't think we're going to be out of work any time soon.



“ I will miss the entrepreneurial spirit of Imperial, where change is encouraged rather than feared.”

What are you most proud of from a leadership and organisational capacity?

Certainly leading the redevelopment of the Hammersmith Campus, where we've probably spent the best part of £200m rebuilding and refreshing that campus and it's now really special – although we've still a way to go to seeing that all the way through. I think setting up a partnership agreement with the Institute of Cancer Research (ICR), has been an important thing to be involved with. One of the biggest legacies could well be in helping to drive the no smoking on Campus campaign at Imperial.

What will you miss most about Imperial?

I'll miss some terrific colleagues and relationships I've built over 14 years, I will miss the entrepreneurial spirit of the place, where

change is encouraged rather than feared. I will miss the fact that if one makes a good rational argument for something, it will be listened to: that's something very special to Imperial that it needs to keep.

With the Oxford position you're returning to familiar terrain, but what are some of the challenges ahead?

Many of the issues in UK medicine today are generic to all top medical schools, be they issues of funding, student recruitment, of attracting and retaining the best researchers, so I think a lot of the things are the same. But I think the culture of the two organisations is very different. Having known Oxford a little bit from before and still knowing a lot of people there, I hope it will be a successful transition back.

inside*

story

Proud pinnacle

Imperial celebrates 125th birthday of Queen's Tower on South Kensington Campus

The Imperial community is set to celebrate the 125th birthday of the Queen's Tower – the shining emblem of the College's excellence in research and learning.

This week marks the 125th anniversary of the 'topping out' of the Queen's Tower. The five-day celebration will give staff, students and the wider Imperial community the chance to learn about the history and significance of the late-19th century building.

From facts about the 10 bells housed within the copper covered dome, to anecdotes about its presence in popular culture, information about the tower will be shared across the College's communication channels throughout the week.

The commemorative activities will culminate on Friday 17 November – the exact date one-and-a-quarter centuries after the last stone was set atop the Queen's Tower – when tours will be led inside the 287-foot structure.

Standing proud: A bit of history

The Queen's Tower is the last remaining part of the Imperial Institute – one of the institutions which would come to form what today is Imperial College London – which was originally built in 1887 to mark Queen Victoria's Golden Jubilee.

In all, 66 architects submitted designs for the Institute, with the winning neo-renaissance style design belonging to Thomas Edward Colcutt. It was built to house a library, conference rooms and exhibition galleries with gardens at the rear. In 1892, when the tower was topped out, 10 bells were installed in its belfry. Known collectively as the Alexandra Peal, the bells were donated by Mrs Elizabeth M. Millar of Melbourne, Australia.

The tower was originally the central of three towers connected in a 700-foot-long building which ran parallel to Exhibition road. In the 1960s, 80 years after the original Institute building was erected, the decision was made to partially demolish the Imperial Institute to make way for the expansion of Imperial College. Due to opposition from some major cultural organisations of the day, it was agreed that the central tower would remain standing.

Imperial civil engineers were brought in to consult during the demolition – most notably Professor Sir Alec Skempton – to advise on the best ways to stabilise the tower when its surrounding buildings were taken down.

Today, the Queen's Tower is owned by Imperial, and has become the most recognisable architectural feature of the College, appearing in everything from marketing materials to seasonal greetings cards.

—ANDREW YOUNGSON, COMMUNICATIONS AND PUBLIC AFFAIRS

STATS SELECTION

- Used to be called the Colcutt Tower after its designer, the Victorian architect Thomas Edward Colcutt (who also designed the Savoy Hotel)
- Has ten bells in total. Known collectively as the Alexandra Peal, the bells are named after British royal family members, including Victoria, Albert Edward, George, Victoria and Maud.
- Stands 287 feet tall, and has 324 steps in total
- There were once four stone lions at the foot of the tower. When most of the Institute was demolished in the 1960, two lions found a new home in the new Commonwealth Institute in Holland Park.
- A Queen Victoria statue which once was housed inside the tower can now be seen standing proudly in the main entrance to the South Kensington campus.
- When the tower was opened in 1893, over 25,000 people were present, including Queen Victoria.



Cultural awakenings

In the summer, Imperial undergraduates joined hundreds of students from around the world for a two week learning and cultural experience in Beijing.

The programme, hosted by Tsinghua University, combined lectures, group activities, problem-solving and field trips – covering the areas of economics, environment, architecture, international relations and history. In addition, one stream of the programme focused on detailed environmental issues and solutions faced by China, including clean energy, air pollution, waste water management, urban sustainability.

The 13 students who were successful in applying to the scheme – all in their first or second year of study at Imperial – received scholarships to cover all costs of the Summer School.

For most of the group it was their first time in China – and they approached the experience with a mixture of excitement and trepidation.

“Travelling to China was a dream come true for me. Since I can remember I’ve been fascinated with Asian culture and tradition. Coming to Tsinghua University was a great adventure,” said Marek Wolczynski (Biochemistry with German for Science).

The deep end

The nature of the trip was intentionally immersive and some students were initially overwhelmed by the size of Beijing and Tsinghua’s sprawling campus; the complexities of the transport network; and language barriers.

But in nearly all cases this was actually confidence-building and led to strengthening of bonds with other international students, as Marta Nunes de Abreu (Biomedical Engineering) recalls.

“I found the most challenging part having no previous travel experience alone and so having to navigate the journey has now given me a lot more confidence for the future,” said Genevieve Butt (Biological Sciences).

With many students coming from physical sciences and engineering backgrounds, there

was a period of adjustment to unfamiliar concepts, often in the lectures about China’s very complex and multi-faceted environmental challenges. But the students enjoyed drawing on and adapting existing skills to a different set of problems.

“Because I was starting from pretty much ground zero, my learning curve was an exponential one. I was exposed to problems and theories previously unheard of – the idea of solving and modelling environmental problems with economics frameworks was completely new to me,” said Yan Tong Goh (Mathematics).

Innovation challenge

Once of the most rewarding activities in terms of academic and professional development was the summer school group project, around the theme of big data. This involved the teams developing a comprehensive strategy to address certain aspects of Beijing’s pollution crisis. Ideas developed by Imperial students included integrating PM0.1 air quality sensors into Beijing’s public bike sharing network, in order to get real-time maps of air pollution across dispersed areas. Another idea was for a smartphone app to facilitate domestic carbon trading among householders. In fact Imperial students were among the teams that came first, second and third in the competition.

Ayush Dharap (Physics) said of the group project: “This experience allowed me to manage a group, allocate tasks based on people’s

STATS SELECTION

- Imperial has 2,600 Chinese students – the largest group other than Britons – and 225 Chinese staff
- Imperial has more than 7,000 alumni in China including acting Mayor of Beijing Chen Jining
- Imperial researchers have co-authored more than 3,000 publications with their Chinese peers over the past five years.

previous experience and skills, deal with disagreements on the project direction in a professional fashion.

“Collaboration is the foundation from which we can tackle most of our issues, and getting to spend two weeks with likeminded, yet diverse individuals, all equally driven to contribute to the field of environments is an experience I highly valued.”

The summer school was rounded off by sight-seeing tours to the Great Wall of China at Badaling and Qufu, the hometown of one of China’s most iconic thinkers and philosophers Confucius.

“I knew it would be an incredible opportunity, but I could not have known just how eye-opening it would be,” said Yan Tong Goh.

Marta Nunes de Abreu (Biomedical Engineering) went further: “All in all, I believe I am now a more international person, in the sense that I have a better idea about the role that I play in this globalized world, and where I want to go from there.”





Ship shape

Imperial alumnus and Honorary Lecturer Dr Eleanor Schofield leads the conservation effort for the Mary Rose, a salvaged 16th Century Tudor warship.

When the Mary Rose set out from Portsmouth on 19 July 1545 to repel a French invasion fleet, she was a battle-hardened flagship looking back on 34 years of successful service to King Henry VIII. She had fought in campaigns against France, Scotland and Brittany and was still relatively fresh from a rebuild 10 years prior.

Yet, on that day, she sunk within sight of port in the Solent sea channel between Portsmouth and the Isle of Wight. Many theories exist about why she went down so quickly – human error, the wind and tide, French firepower – and we’ll probably never know the exact reason.

But thanks to the efforts of conservators, archaeologists and scientists over the past 35 years, the Mary Rose provides a veritable time capsule of technology, medicine and socioeconomic conditions in 16th Century Britain – which is now on public display in Portsmouth Historic Dockyard and inspiring a new generation.

Legacy

Dr Eleanor Schofield is Head of Conservation and Collections Care at The Mary Rose Trust in Portsmouth. She is in charge of keeping the ship itself and the wealth of artefacts in the best possible condition and is responsible for instigating fresh investigations and research into the collection.

Although Eleanor was only a small child when the Mary Rose was excavated in 1982, she has inherited the legacy of the conservators and volunteers who came before her.

After its excavation, the Mary Rose was initially put into passive storage and constantly kept moist with chilled water. It was then sprayed with a polymer called polyethylene glycol (PEG).

“Whilst the structure can look quite intact, there is actually a considerable amount of wood matter that has been lost, and when it was excavated it was essentially being held up by water. If you simply dried it, it would shrink and basically collapse. So, you must replace that water with PEG,” Eleanor says.

“After being sprayed for many years with PEG we started drying it



Dr Eleanor Schofield

out around four years ago. There’s always some movement associated with drying so we need to monitor that constantly. We’ve currently got an Imperial student working over the summer to monitor the movement from laser scans, to see how it correlates with the drying process.”

In another project, Eleanor’s team is using a neutron beam to map how the wood dries now it is impregnated with PEG.

“Although, the structure started out its life as wood, once you put PEG in it doesn’t have the same properties anymore: it’s a composite material. The neutrons allow us distinguish between the elements.”

Conservation calling

Eleanor graduated from Imperial with an MEng in Materials Science and Engineering in 2002, going on to complete a PhD at the College, also in materials science. Yet, her

interest in conservation came later, as a happy by-product of her materials expertise and particularly her skills in using synchrotron sources for advanced x-ray analysis of materials at the nanoscale.

Following a postdoc position, Eleanor went full time at the Mary Rose Trust in 2012 as Conservation Manager, moving up to lead the entire Department in 2016. The team celebrated a major milestone in July 2016 when a new state-of-the-art museum opened to house the ship and collection, offering the public unrestricted views. With that access came unique challenges though. The museum has a suite of sensors and regulators that control temperature and humidity and alert the team, via text, day or night if something is awry.

“In some ways, it’s like a materials scientists’ dream being here, but in other ways it can be exceptionally overwhelming.”



1/10
women

in the UK are affected
by Endometriosis.

If that statistic was true of just Emma's department alone, here's how many women would be affected.

In the swim: Dr Emma Watson completes epic Channel crossing

Dr Emma Watson, Department Operations Manager for Earth Science and Engineering, completed a relay swim of the English Channel at the end of October, helping to raise awareness of endometriosis.

Since the Channel swim season opened in June, Emma was waiting for the call. The three-person team had been scheduled to swim in the first week of July, but were delayed due to bad weather. Emma and team eventually set off at 01.00 on 26 October from Dover Harbour, successfully completing the epic crossing to France – currently the latest group to go in 2017.

Emma used the opportunity that the wait provided to raise awareness of endometriosis (see box), by taking a series of photos of her 'waiting for

“It was such a relief to finally get the call to swim and not have to postpone until next year.”

the call' to start the swim, actively posting across social media with a fantastic response from people inspired by her feat and campaign.

“The wait was excruciating,” Emma said. “It was such a relief to finally get the call to swim and not have to postpone until next year.” After leaving Dover Harbour by boat, the swim officially started from Samphire Hoe Beach which I had to reach in the dark by swimming away from the boat, which in itself was rather daunting. Our months of training put us in good stead to complete the swimming despite the cold, swell, strong currents or sheer hours of swimming but nothing really prepared me enough for the sea sickness. It was a relief to jump in the water and swim instead of throwing up or feeling nauseous whilst on the boat. I thought it might be my toughest challenge to date and it certainly was. 13 hours 36 minutes of swimming later and we reached France. Slower than the Euroshuttle but much more satisfying!”

Emma credits the College's flexible working policy for allowing



Emma (left) with her swimming team in France

her to undertake the training required for her epic team swim. The support from the College has facilitated Emma to not only train for this cold water swim, but also to share positive examples of exercise and body image.

From the Earth Science and Engineering Department, we congratulate her on her amazing achievement, rigorous cold-water training and her bravery.

Emma has raised a total of £4,734.36, far surpassing her target of £1,650. You can still donate by visiting bit.ly/emma-swim

—VICTORIA MURPHY, EARTH SCIENCE AND ENGINEERING



What is endometriosis?

Endometriosis (pronounced en-doh-mee-tree-oh-sis) is the name given to the condition where cells like the ones in the lining of the womb (uterus) are found elsewhere in the body.

Each month these cells react in the same way to those in the womb, building up and then breaking down and bleeding. Unlike the cells in the womb that leave the body as a period, this blood has no way to escape.

It is a chronic and debilitating condition that causes painful or heavy periods. It may also lead to infertility, fatigue and bowel and bladder problems. Around 1.5 million women in the UK are currently living with the condition. Endometriosis can affect all women and girls of a childbearing age, regardless of race or ethnicity.

From Endometriosis UK:
www.endometriosis-uk.org



long
service

Staff featured in this column have given many years of service to the College. Staff listed celebrate anniversaries during the period 01 May – 31 October 2017. The data are supplied by HR and correct at the time of going to press

30 years

- Deslyn Brown, Senior Research Services Administrator, Faculty of Engineering
- Professor Nick Buenfeld, Head of Department, Professor Concrete Structures, Civil and Environmental Engineering
- Professor Chris Bulpitt, Visiting Professor, Department of Medicine
- Professor Donald Craig, Professor of Organic Synthesis, Department of Chemistry
- Professor Paul Cullinan, Professor in Occupational and Environmental Respiratory Disease, National Heart & Lung Institute
- Professor Timothy Evans, Professor of Intensive Care Medicine, National Heart & Lung Institute
- Dr Linda Giorgi, Examinations Officer, Life Sciences
- Mrs Catherine Graham, Admissions Officer (FOE)
- Mr Shahid Hanif, Technician, Physics
- Mr Paul Hine, Technology Analyst – Development, Information & Communication Technologies
- Miss Siew Tin Lim, Senior Programme Coordinator, Business School
- Professor Gennaro Marino, Visiting Professor, Life Sciences
- Mr Ron Millward, Laboratory and Workshop Services Manager, Civil and Environmental Engineering
- Dr Mark Sullivan, Senior Lecturer, Surgery & Cancer
- Professor Richard Syms, Professor, Electrical and Electronic Engineering
- Professor Howard Thomas, FMedSci, Emeritus Professor of Hepatology, Medicine
- Mr Simon Webb, Payroll Officer, Finance Division
- Miss Susanne Westfold-Scott, Imperial Consultants, Contracts Manager
- Mr Peter Wilkinson, Groundperson Silwood, Estates Division
- Professor Robin Williamson, Anatomy Demonstrator, Surgery & Cancer
- Dr Edward Shaoul, Honorary Clinical Senior Lecturer, School of Public Health
- Dr John Pain, Admissions Officer, Physics

40 years

- Dr Jamshid Alaghaband-Zadeh, Honorary Senior Research Fellow, Department of Medicine
- Mr Mike Brookes, Reader in Signal Processing, Electrical and Electronic Engineering
- Dr Frank Bruce, Emeritus Reader, Civil and Environmental Engineering
- Professor Mustafa Djamgoz, Professor of Cancer Biology, Life Sciences
- Professor Nick Franks, Professor of Biophysics and Anaesthetics, Life Sciences
- Professor Nigel Graham, Professor, Civil and Environmental Engineering
- Mr Clive Hargreaves, Technical Services and Facilities Manager, Civil and Environmental Engineering
- Mrs Vera Kasey, Technician, Physics
- Mrs Wilma Larbie, Stores Administration Officer, Catering Services
- Dr Dan Moore, Emeritus Reader in Computational Applied Mathematics, Mathematics
- Professor John Perkins, Visiting Professor, Chemical Engineering
- Dr Radha Ramachandran, Honorary Lecturer, Civil and Environmental Engineering
- Mr Simon Stoner, Technician, Mechanical Engineering

50 years

- Emeritus Professor Donald Davies, Emeritus Professor in Toxicology, Department of Medicine
- Emeritus Professor Peter Dornan, Senior Research Investigator, Physics
- Professor David Ewins, Distinguished Research Fellow, Mechanical Engineering
- Mr Paul Grant, Academic Professional, Earth Science & Engineering
- Emeritus Professor Robin Smith, Distinguished Research Fellow, Physics
- Emeritus Professor Graham Matthews, Emeritus Professor, Life Sciences (Silwood Park)
- Dr Roy Jacobs, Senior Teaching Fellow in Applied Mathematics, Mathematics

60 years

- Professor Peter Mantle, Emeritus Professor, Centre for Environmental Policy



SPOTLIGHT

Clive Hargreaves,
Technical Services and Facilities Manager,
Civil and Environmental Engineering

40 years

After graduating from Aston University with a Bachelor's degree in Civil Engineering I went onto to study for a Master's in Structural Engineering at Imperial in 1974 and it just mushroomed from there. In the early days I was working exclusively on research projects. It was a very exciting time because the Department played a big role in national and global challenges in the field of structural and civil engineering. I took on the role of Technical Services and Facilities Manager in 1993, which I have performed to this day. In doing so I stepped away from doing the research itself and accepted the challenge of trying to make research actually happen in the first place – or at least facilitating it and putting in place the infrastructure to enable it. A technician once said to me: 'it's a great place to work, we should be paying them – they even provide heating and lighting!' We certainly don't have a cushy time; we all work very hard and put the hours in. But I think it's great fun. I have never had a Monday morning feeling in my life. Never.





21 NOVEMBER, 12.30–13.30

How Science Got Women Wrong

For centuries, scientists have told us that women are biologically inferior to men, that they are intellectually less capable, sexually more chaste, and naturally designed to be homemakers and caregivers. Why? Science journalist

Angela Saini, author of *Inferior: How Science Got Women Wrong* and *The New Research That's Rewriting the Story*, has investigated the science behind gender stereotypes and argues that bias and prejudice have tainted research.



5 DECEMBER, 17.00–20.00

Imperial Fringe: Walking in the Air

Come in from the cold and breathe in a festive evening celebrating the invisible gases that flow around us, fill our lungs, can knock us off our feet and will determine the future of our climate. How do we investigate the invisible

gases that surround us? How does Christmas affect our atmosphere? Find out as you enter a supersonic wind tunnel, hold a cloud in your hand and explore London's air pollution and its impact on your health.

take note

Staff recognition

Nominations are now open for cross-College awards schemes that recognise and celebrate our staff's work and their contribution to the College's mission, including the President's Awards for Excellence in Education, Research and Societal Engagement; Julia Higgins Medal and Awards; and Provost's Awards for Excellence in Health and Safety.



Nominations close on Friday 9 February 2018, for more information visit imperial.ac.uk/staff/college-staff-awards

16 FEBRUARY, 17.30

The Future of Money

Celebrating the research behind our money, we are hosting a special discussion event with the Bank of England's chief cashier, Victoria Cleland.



15 NOVEMBER, 17.30

Big Data needs Big Ideas

The 2017 Vincent Briscoe Lecture will be an engaging social science to develop effective security science and technology.



15 NOVEMBER, 17.15

Food fight: Appetite control

Professor Kevin Murphy's inaugural lecture at The Annual Awards for School of Medicine Teaching Excellence.



21 NOVEMBER, 18.00

Meet the Artists on show in the Blyth Gallery

Join the Blyth team for a drink and a chat with visiting artists: Rebecca Byrne (work pictured above), Liz Elton, Tim A. Shaw, Susan Sluglett, Laura Smith, Tamsin Relly, Alex Roberts.

22 NOVEMBER, 17.30

Mining for wimps

In his inaugural lecture, Professor Araujo will tell the story of the search for dark matter and the development of a sensitive new detector.



29 NOVEMBER, 12.30

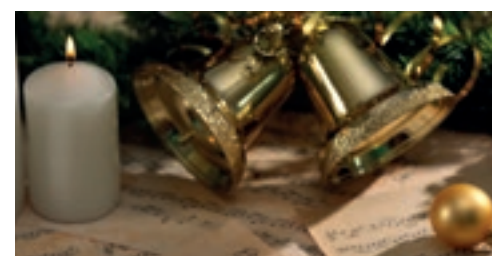
Department of Civil and Environmental Engineering Research Showcase

Showcase featuring exhibitions, demonstrations, laboratory tours, and seminars with leading academics and industry practitioners.

30 NOVEMBER, 18.00

Design Engineering Lecture: From Engineer to Artist – a Rake's progress...'

Nick is a multi award-winning graduate of Imperial College London and the Royal College of Art. He will share anecdotes and images about his journey from engineering graduate to entrepreneur and artist.



11 DECEMBER, 18.00

College Carol Service by Candlelight

A free service of readings and carols with music from the Imperial College Chamber Choir. Followed by festive refreshment.

Stay in the loop

✉ Visit www.imperial.ac.uk/events for more details about these events and others. To sign up for regular updates about Imperial events please email: events@imperial.ac.uk

