

## Star makers

The researchers and alumni trying to harness the power behind the Sun

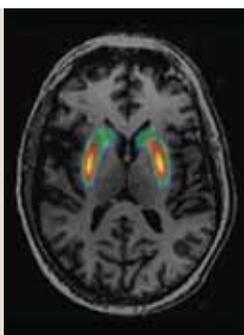
 **CENTRE PAGES**



### NEW PRESIDENT

Introducing Professor Alice Gast, 16th Head of Imperial

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Promising first results in Parkinson's disease trial

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### MARKING THE GREAT WAR

Loan your memorabilia to a new exhibition at College

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EDITOR'S CORNER

## Securing the future

Earlier this month Professor Alice Gast spoke of her excitement at being appointed [Imperial's next President](#), highlighting the College's mission "to teach, research and translate its work for the benefit of society" (page 3). Certainly for me and others that's one of the most motivating things about working here – knowing that, even if indirectly, we are together contributing to a [better, more efficient world](#). This issue of *Reporter* explores fusion energy – an area of research that, if successful, purports to be able to ensure energy security and alleviate climate change (centre pages). The work is nothing if not ambitious – and the idea that humans can master the power of the Sun might seem foolhardy. But the potential [impact on society](#) could not be greater. This is where scientists are on the front lines, and if you can excuse the military allusions, they're not giving up the fight anytime soon.

ANDREW CZYZEWSKI, EDITOR

*Reporter is published every three weeks during term time in print and online.*

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## New emergency childcare service for staff

Imperial will provide staff with access to emergency child and adult care, as part of a new service to support parents and carers at the College.

The new service is being rolled out in partnership with specialist provider *My Family Care* to offer all staff access to three backup care services – emergency childcare, school holiday cover and backup adult and eldercare.

The College funds the registration

costs to *My Family Care*, with individual staff paying for any care depending on how long services are required for.

Noting that Imperial is the first university in the UK to offer the service, Provost, Professor James Stirling, said: "We recognise that parents and carers, who make up a significant proportion of our staff, can find it challenging to juggle the demands of work and family. This initiative is part of our continuing commitment to ensuring that staff receive the support and help that they need to balance these responsibilities."

This step comes in response to the 2012 Maternity and the 2013



Paternity Surveys, in which more than half of respondents called for back-up childcare provision at the College.

—DEBORAH EVANSON, COMMUNICATIONS AND PUBLIC AFFAIRS

To register for *My Family Care* visit:  
[imperial.ac.uk/hr/procedures/family/myfamily](http://imperial.ac.uk/hr/procedures/family/myfamily)

## New Year's Honours for Mary and Magdi

Two Imperial academics have been recognised for their achievements in science and innovation in the New Year's Honours for 2014.

Sir Magdi Yacoub, Professor of Cardiothoracic Surgery at the National Heart and Lung Institute, has received the Order of Merit, which is awarded to individuals of greatest achievement in the fields of the arts, learning, literature and science.

Professor Mary Ritter, CEO of Climate-KIC and former Pro-Rector for Postgraduate and International Affairs, has been awarded an OBE for services to scientific research and innovation.

President & Rector Sir Keith O'Nions said: "Sir Magdi and Mary are exemplars for the culture of innovation, scientific excellence and outstanding education which we strive for at Imperial. Their awards are richly deserved."

Professor Yacoub established the largest heart and lung transplantation programme in the world, where more than 2,500 transplant operations have been performed. He has also developed novel operations for a number of complex congenital heart anomalies.

"The award is totally unexpected and highly appreciated," said Professor Yacoub. "It's the result of the work of many people in many countries."

In the three years that Professor Ritter has been at the helm of the Climate-KIC it has grown to a community of over 200 partners across Europe from business, academia and the public sector, with a budget of more than €70 million for 2014.

"I am highly honoured and absolutely thrilled," said Professor Ritter. "While the OBE is a personal award, it is also a recognition of all those who have worked with me throughout my scientific research career."

—SAM WONG COMMUNICATIONS AND PUBLIC AFFAIRS

## Imperial College London



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# Alice Gast to lead Imperial

The College has announced that Professor Alice P. Gast will succeed Sir Keith O’Nions as President from September 2014, becoming the sixteenth head and first woman to lead Imperial.

Professor Gast, an internationally renowned scholar in the field of chemical engineering, is currently President of Lehigh University and former Vice President for Research and Associate Provost at the Massachusetts Institute of Technology.

As President, Professor Gast will lead the College’s strategy, including the development of its new 25 acre campus, Imperial West, and its links to government, industry, philanthropists and alumni.

At Lehigh she focused on the quality of undergraduate and postgraduate education and their integration with research. She has overseen a 47% increase in the size of Lehigh’s campus estate, expanded the university’s international presence and concluded its \$500 million fundraising campaign.

She has been a US Science Envoy to Central Asia and is currently a Board Director of the Chevron Corporation and Trustee of King Abdullah University of Science and Technology in Saudi Arabia.



Responding to her appointment Professor Gast said: “I have always been excited by what goes on at Imperial, one of the world’s greatest scientific universities. I look forward to getting to know its whole community of staff, students, alumni, friends and supporters, and to helping Imperial to grow and to continue to push the boundaries of learning, discovery and innovation over the coming years.”

Sir Keith O’Nions, who has led Imperial as President & Rector since January 2010, warmly welcomed Professor Gast’s appointment, adding: “Working with so many brilliant students, academics and staff at one of the world’s great universities has been a tremendous privilege. I am delighted to be passing this honour and responsibility to such a distinguished figure as Alice Gast.

—JOHN-PAUL JONES, COMMUNICATIONS AND PUBLIC AFFAIRS

## Second wind for aerodynamics research

Imperial is to lead on a new National Wind Tunnel Facility aimed at keeping Britain at the forefront of experimental aerodynamics and fluids research.

During a visit to the College this month, Universities and Science Minister David Willetts also announced that Imperial and its partners in the venture – the Universities of Oxford, Cambridge, Southampton, Cranfield, Glasgow and City – will receive £13.3 million to upgrade wind tunnel infrastructure, £4 million of which will go directly to the College.

Mr Willetts said: “This new investment will support research that is vital to the UK economy, including developing the next generation of fuel efficient heavy goods vehicles. This will create huge energy savings to businesses, as well as bringing environmental benefits.”

For decades Imperial has been leading in this field and its Honda Wind Tunnel facility has been used by industry and academics to advance research in a range of areas from Formula One car design to the creation of better aircraft components.

The funds will be used by researchers at Imperial to position an array of lasers inside the wind tunnel to more accurately model airflow. For example researchers learning more about how heavy vehicles such as lorries are affected by drag, which affects fuel efficiency, will use the technology to capture airflow data simultaneously from multiple points, so that better vehicle designs can be developed.

Professor Jonathan Morrison (Aeronautics), who leads Imperial’s wind tunnel facility, said of the investment: “This will have a transformative effect and drive innovation across a broad range of sectors in a variety of fields. At Imperial, this will help us for instance, design bridges that can better withstand wind induced vibrations, more efficient wind turbines and aircraft wings that improve fuel efficiency.”

—COLIN SMITH, COMMUNICATIONS AND PUBLIC AFFAIRS

### in brief

#### Perfect 10 postgraduate centres

During a visit to Imperial, Universities and Science Minister David Willetts announced funding for 19 more Centres for Doctoral Training (CDTs), including three based at Imperial. Dr Paul Nicholas Stavrinou (Physics) will lead the CDT in Plastic Electronic Materials, Professor Christopher Cheeseman (Civil and Environmental Engineering) will lead the CDT in Sustainable Civil Engineering, and Professor Bill Lee (Materials) will head the CDT in Nuclear Energy. Their creation now takes the total number of CDTs based at Imperial to ten, with a further five CDTs that the College is partnering in.

#### Cyber centre

Averting cyber-attacks and other threats to vital systems that control the UK’s industry and infrastructure will be the focus of a new institute at Imperial. Researchers at the Research Institute into Trustworthy Industrial Control Systems will explore potential threats to the infrastructure that controls a range of processes, from nuclear power generation, to manufacturing, to energy distribution and the national rail network. They will analyse how cyber-attacks that could shut down these Industrial Control Systems can be prevented or counteracted.

#### Indian alumni pledge

As part of a series of Imperial alumni events held this month in India, former students in Chennai made plans for a new chapter of the alumni association at a reception hosted by President & Rector Sir Keith O’Nions. Imperial is in touch with 800 alumni in India, around 40 of whom live in Chennai. The Chennai reception, held on 6 January, provided the first opportunity in recent years for alumni living in and around the city to get together.



“There is no one low-carbon solution, but many low-carbon solutions.”

PRESIDENT OBAMA’S ENERGY SECRETARY, DR ERNEST MONIZ, OUTLINES THE US GOVERNMENT’S APPROACH TO CLIMATE CHANGE DURING A VISIT TO IMPERIAL THIS MONTH.



## Scholarship scheme for Indian postgrads expands

The Imperial College India Foundation has announced the expansion of their scholarship programme for academically outstanding Indian students to study at postgraduate level at Imperial.

Launched in 2013, the programme will offer two fully funded Master's scholarships from 2014, as well as one full PhD scholarship, for Indian nationals residing in India.

Scholarships will also now be available to applicants for study in the Faculty of Natural Sciences as well as the Faculty of Engineering and the Business School. Funding is provided by the alumni and supporters of the Foundation, with the College matching the amount pledged.

The aim is to attract the most talented Indian students to the College, with a focus on supporting those in financial need. Students will be given access to world class academic training and support throughout their studies, which can help them contribute to society, industry and academia upon their return to India.

The launch of the scholarships coincided with an 11-day visit by President & Rector Sir Keith O'Nions to India earlier this month. During the trip to Chennai, Kolkata, Mumbai and New Delhi he hosted an alumni event in each city and met with representatives from government, industry, and higher education institutions.

Sir Keith said: "The expansion of these scholarships builds on the historic and flourishing relationship between Imperial and its Indian alumni and supporters. Their support is central to this scheme and we're grateful that their generosity has enabled it to grow further still."

—DEBORAH EVANSON, COMMUNICATIONS AND PUBLIC AFFAIRS



## Masters students get helping hand

Imperial will provide funding totalling £1.5 million to academically excellent Master's degree students from lower-income backgrounds.

The Master's Support Scheme, which is funded by a grant from the Higher Education Funding Council for England (HEFCE), is a pilot scheme for the academic year starting autumn 2014 that will allow the College to provide successful UK applicants with grants towards tuition fees and, in some cases, their living expenses.

The scholarships are designed to encourage the best and brightest students to pursue Master's programmes in the Faculties of Natural Sciences, Engineering and Medicine, and are aimed at those who might otherwise have been deterred because of financial constraints.

John Neilson, Secretary & Registrar, said the investment was a welcome boost to improve accessibility to Imperial's world-class postgraduate courses. "We are committed to attracting the best and the brightest students from all backgrounds, and this scheme will strengthen the opportunities for these students to move on to high quality employment and research careers."

Scholars will be selected based on academic excellence, with tuition fee waivers up to the value of £10,000 being awarded to successful applicants with household incomes of less than £42,611. Maintenance grants are also available to those from households with incomes of £25,000 or less, in addition to the tuition fee support.

—DEBORAH EVANSON, COMMUNICATIONS AND PUBLIC AFFAIRS

## Mentoring success

A mentoring programme established by alumni in Hong Kong is helping more than 50 students with their personal and professional development, with one-to-one advice sessions and group events.

The scheme was launched by the Imperial College Alumni Association of Hong Kong during a visit by the President & Rector Sir Keith O'Nions in May 2013.

Dr Paulina Chan (Electrical Engineering, 1977), who is championing the scheme, says it enables students to continue their education beyond the core curriculum. "It fits perfectly with my personal vision of real education, which is well beyond studying and making all A's," she adds.

The scheme is also forging friendships, as student Cannis Chan (Chemical Engineering) recalls. "My first meeting with my mentor ended up being a very simple dinner but we spent two hours talking non-stop. He was interested in what



life is like for students now and how I spend my days at Imperial, and because he's just a bit older than me it feels like we are friends."

In addition to the meetings between mentors and mentees, two larger group events have also been organised; a mid-summer wine tasting reception in September 2013, and an afternoon tea in January 2014.

Ken Ho, Chairman of the Hong Kong Alumni Association, said: "The mentoring programme constitutes one of the association's signature initiatives and provides a platform for alumni to share their life lessons and wisdom in order to help nurture the talents of our next generation."

—JESSICA ADAMS, COMMUNICATIONS AND PUBLIC AFFAIRS

## media mentions

—BY SAM WONG, COMMUNICATIONS AND PUBLIC AFFAIRS



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### HS2 boost to economy 'exaggerated'

*THE DAILY TELEGRAPH* ▶ 5.1.14

A key report used by the government to make the economic case for the HS2 high-speed rail line has been questioned by leading academics, *The Daily Telegraph* reported. Accountancy firm KPMG were hired by the Department for Transport to assess the economic benefits that would accrue from building the new line connecting London with Leeds and Manchester. However, experts told the Treasury Select Committee that the £15 billion annual boost predicted by the report is based on dubious methodology. "I don't think this statistical work is reliable," said Professor Dan Graham (Civil and Environmental Engineering). "Undoubtedly the work could be done better." Two authors of the report conceded that it did not have a "firm statistical foundation."

### WHO shock guidelines may be deadly

*BBC NEWS* ▶ 14.1.14

Thousands of children could be dying each year because the World Health Organisation has not updated guidelines for treating those going into

shock, researchers warned. Shock is a common consequence of severe infections such as malaria, and current guidelines say affected children should be given large quantities of fluid. But a large study led by Imperial researchers in 2011 found that this treatment increases death rates. Professor Kathryn Maitland (Medicine) told the *BBC*: "We're very concerned that two and a half years later the guidelines have not changed." The outdated advice is probably leading to thousands of extra deaths, she added.

### Doing sums with light

*NEW SCIENTIST* ▶ 9.1.14

Exotic materials that bend light in extreme ways could be used to perform complex mathematical operations, according to *New Scientist*. Tools for manipulating light waves have taken off in recent years thanks to the development of metamaterials. Researchers at the University of Pennsylvania have simulated a metamaterial that works as an analogue computer to carry out calculus functions. "It's a very imaginative application of metamaterials – it takes things off in a completely new direction," said Professor John Pendry (Physics), who pioneered the field of metamaterials. Although image-processing is the obvious application,

the basic mathematical tools could also be used to solve equations, Professor Pendry added.

### Bang goes the puppy

*METRO* ▶ 10.1.14



A six-month-old puppy blew up his owners' house in Yorkshire after he chewed through a can of deodorant, *Metro* reported. Greyhound cross Zeus chewed through a can of Lynx deodorant and, as its contents sprayed out, they were ignited by the heat from a lamp. Professor Tom Welton (Chemistry) said the butane contained in deodorant was highly flammable. "The lowest temperature it can be ignited is minus 60°C, so it is very dangerous stuff," he told the newspaper. "These cans do come with warnings but obviously a puppy can't read those." Zeus and five other pets in the house escaped unharmed, but the damage to the property was estimated at £2,000.

## awards and honours

### PHYSICS

#### Astronomy gong for Dougherty team

The Magnetometer Team on the Cassini spacecraft, led by Professor Michele Dougherty (Physics), is to receive the Royal Astronomical Society (RAS) Group Achievement Award in Geophysics. The RAS awards honour "outstanding contribution to astronomy". In bestowing the award, RAS said that the Cassini-Huygens mission to the Saturn System had been one of the most successful space missions ever undertaken and that the Magnetometer had been one of the most successful instruments



Saturn's moon Enceladus

aboard the spacecraft. One of the key findings of Cassini – and one of the most unexpected and scientifically challenging – was that the small, icy moon Enceladus is pouring a jet of water into Saturn's magnetosphere. This finding was a direct result of the efforts of the Magnetometer Team.

### ENGINEERING

#### Gabor's legacy lives on

Professor Erol Gelenbe (Electrical and Electronic Engineering), the Dennis Gabor Chair, has received the 'In Memoriam Dennis Gabor Award' from the Hungarian Ministers of Education and of Science. The award recognises outstanding scientific work with a strong innovation content, in line with Gabor's own contributions. Dennis Gabor was a Hungarian scientist who worked at Imperial in the 1950s and 60s, where he invented holography, for which he later received the 1971 Nobel Prize in Physics. Professor Gelenbe's own research meanwhile focuses on self-aware and self-organising computer networks and has applications in engineering, physics, biology, economics and the internet.

### MEDICINE

#### Boost for health protection research

The College has been awarded funding to establish four new Health Protection Research Units (HPRUs). The units are funded by the National Institute for Health Research and partnered by Public Health England (PHE). Research at the HPRUs will focus on: developing better methodologies for modelling infections; fighting antimicrobial resistance and other healthcare associated infections; combating respiratory infections; and improving our understanding of the health impacts of environmental hazards.

# Climate change poses serious threat to Britain's peat bogs

British peats will shrink away in the face of climate change and disappear from many regions of the UK, a team of leading experts has found.

Peatlands are a haven for wildlife and naturally filter water, playing a major role in both purification and flood prevention, particularly around cities such as Derby and Sheffield. They are also important for storing carbon — currently holding roughly as much carbon as is emitted by the entire nation over three years.

A recent study, jointly led by Professor Colin Prentice (Life Sciences), was one of the first to consider the impacts of climate change on the UK upland peatlands.

He notes that the peat is sensitive to climate because its existence is dependent on a strict set of environmental conditions. "It's a very unusual thing; it requires a particularly cool and wet climate to develop. If you ever have mean summer temperatures that are too high, then the sphagnum moss that constitutes the peat doesn't like it. It doesn't like to be very warm," Professor Prentice explains.



The Peak District National Park is already under threat from degradation and could be further hit by climate change

The researchers first devised a model to predict where peat can live and how fast it could grow. This was important to reliably reproduce the areas known to be peatland bogs today. They then looked at a scenario where the Earth would warm by four degrees by the end of the century.

They found that climate change will restrict the area over which new active peat can be formed, shrinking it to a core area in North West Scotland and parts of Ireland. This could in turn release stored CO<sub>2</sub> into the atmosphere, further exacerbating global warming.

However, Professor Prentice says that simple steps to protect the UK's peatlands from existing threats, such as overgrazing by farm animals, could ensure that the peat remains firmly in the ground when temperatures continue to rise.

"The peatland can continue to survive and carry out its function of storing carbon and storing water, provided that the many other pressures are reduced," he said.

—MARION FERRAT FOR COMMUNICATIONS AND PUBLIC AFFAIRS

## Hunting quotas could boost lion numbers

Researchers have devised a simple and reliable way to set sustainable quotas for hunting lions, to help lion populations to grow.

Trophy hunting occurs in nine of the 28 African countries that have wild populations of lions. Hunting is legal in these countries but quotas are set to restrict the number of lions that can be killed.

Evidence suggests that it can help conservation efforts because it generates substantial revenue, which can be used to sustain wilderness areas as habitats for wildlife, rather than for other uses such as farming.

"Many people don't feel happy about the idea of hunting animals for sport, especially animals that are as beautiful and impressive as lions," said study co-author Professor E.J. Milner-Gulland (Life Sciences). "However, in some areas, the money that comes in from hunting is what

enables the land to be set aside for wildlife and this provides the lions with a home."

However, there is currently uncertainty over the sustainability of quotas and a lack of reliable data on the total number of lions in some countries. This has contributed to a decline in the number of lions across Africa, from an estimated 100,000 fifty years ago to roughly 30,000 today.

In the latest study the researchers created an algorithm that uses data about how long it takes to find and shoot a lion in a given area to estimate how many adult males can be hunted, whilst allowing the lion population to grow.

They then modelled the effects of introducing their new method for setting hunting quotas in a heavily depleted lion population and found that the number of adult males would grow from around 38 to 100 individuals in 30 years.

"As conservation scientists, we want to ensure that populations of lions can thrive," says Professor

Milner-Gulland. "Our new method for setting quotas relies on information that is easy for governments to get hold of and it should be simple for them to use. The next step is for us to test the method in the field and if it proves successful, we hope it can be widely adopted."

—LAURA GALLAGHER, COMMUNICATIONS AND PUBLIC AFFAIRS

“We want to ensure that populations of lions can thrive.”



Lion numbers have dropped from 100K to 30K in Africa

## Parkinson's patients get boost from gene therapy

A new gene therapy for Parkinson's disease has achieved promising results in its first human tests, involving 15 patients.

Developed by Professor Nicholas Mazarakis (Medicine), Head of Gene Therapy at the Division of Brain Sciences, the treatment uses a modified virus to deliver three genes into the striatum, a part of the brain that controls movement. The genes are intended to boost the production of dopamine, a chemical that becomes deficient in patients with Parkinson's.

Current treatments can elevate dopamine production temporarily, but the cells that produce dopamine continue to degenerate until the treatments are no longer effective. What's more they can also cause severe side effects, such as uncontrollable jerky movements, known as dyskinesia. The new therapy aims to provide a long-term solution by stimulating dopamine to be produced in a different set of cells.

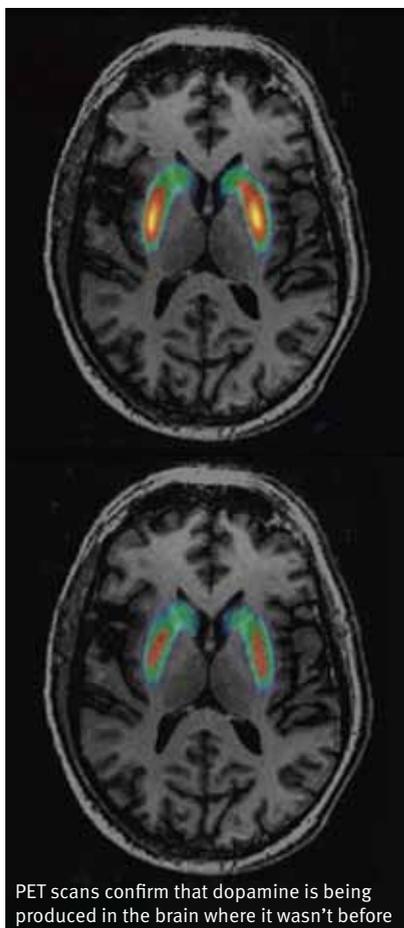
Following promising pre-clinical tests in rats and monkeys, the team

initiated a trial in a small group of human patients with Parkinson's disease. The participants, three in the UK and 12 in France, all in the advanced stages of the disease, underwent a single operation to inject the virus into the brain.

The first patients to have the surgery have now been followed up for four years and the treatment has been safe, with no serious adverse effects. Furthermore the patients' scores on movement tests have improved on average by 30 per cent, and they also report having a better quality of life and the effect has been sustained. PET scans confirm that dopamine is being produced in the brain where it wasn't before.

"I'm very pleased that it has appeared to work in the clinic," said Professor Mazarakis. "It has the potential to move to the next phase. It needs to be done in more people; we have to find the most effective dose, to further increase efficacy, and prove beyond doubt that this is not a placebo effect."

—SAM WONG, COMMUNICATIONS AND PUBLIC AFFAIRS



PET scans confirm that dopamine is being produced in the brain where it wasn't before



### About Parkinson's disease

Parkinson's is a neurological disease that affects around five million people worldwide. The main symptoms are involuntary shaking of particular parts of the body (known as tremor), muscle stiffness (rigidity) and physical movements becoming very slow (bradykinesia). In the advanced stages, patients are often unable to do everyday tasks like washing and dressing without help from a carer.

Parkinson's is caused by the gradual loss of nerve cells in the part of the brain called the substantia nigra. Crucially these cells produce an important chemical messenger called dopamine, which also diminishes as the disease progresses.

It is not known why the loss of nerve cells associated with Parkinson's disease occurs, although genetic factors and exposure to toxins are considered to be possible causes.



Around 1.2 million people died from malaria in 2010

## Malaria drug target raises hope for new treatments

Scientists have taken an important step towards new malaria treatments by identifying a way to stop malaria parasites from multiplying.

A team including researchers from the Department of Chemistry show that blocking the activity of an enzyme called NMT in the most common malaria parasite prevents mice from showing symptoms and extends their lifespan.

Although a variety of antimalarial drugs are available, some strains of the parasite are resistant to treatment. Even if acute illness is cured, the parasite can remain dormant in the blood and return to cause illness later. "The drug situation for malaria is becoming very serious. Resistance is emerging fast and it's going to be a huge problem in the future," warns study lead Dr Ed Tate (Chemistry).

Malaria vaccines have been researched intensively, but none have been introduced into clinical practice.

The new study shows that the NMT enzyme is involved in a wide range of essential processes in the parasite cell,

including the production of proteins that enable malaria to be transmitted between humans and mosquitoes, and proteins that enable malaria to cause long-term infection.

"Here, we've shown not only why NMT is essential for a wide range of important processes in the parasite, but also that we can design molecules that stop it from working during infection," said Dr Tate.

"We need to do some more work in the lab to find the best candidate molecule to take into clinical trials, but hopefully we'll be ready to do that within a few years," he added.

—SAM WONG, COMMUNICATIONS AND PUBLIC AFFAIRS

“The drug situation for malaria is becoming very serious. Resistance is emerging fast and it's going to be a huge problem in the future.”

# STAR MAKERS

## PLASMA PEOPLE: The Imperial scientists grappling with extreme states of matter

Ever since scientists discovered the secret behind the Sun's prodigious energy output they have strived to replicate it. The goal: a near limitless supply of clean, zero-carbon energy that is inherently safer than conventional nuclear power.

Researchers at Imperial were some of the early pioneers who first devised experiments attempting to harness this 'fusion' power (see box, right).

The Sun is made up of plasma – hot, ionised gas – compressed by its own immense gravity. So it seemed logical that squeezing plasma might be a first step to emulate stellar fusion.

This is essentially what Nobel Laureate Sir George Thompson did while at the College in the 1940s. He found that passing electric current through a tube filled with hydrogen plasma generated a powerful magnetic field that compresses and heats the plasma.

The principle worked in a fashion, briefly, before the plasma became unstable and basically fizzled out. That set the tone for fusion research for the next 70 years.

"When it comes to confining plasma, a simple analogy is to imagine taking a handful of jelly and squeezing it as hard as you can – it's going to end badly," says Professor Roland Smith (Physics), Head of Plasma Physics at Imperial. "At the time people thought this would just work. What they didn't realise was that when you squeeze plasmas they have so many different ways of going unstable."

Still, thanks to the work of some pioneering plasma physicists over the decades – such as Imperial's Professor Malcolm Haines, who sadly died last year – fusion research has tentatively progressed.

The most visible example of this is the \$4 billion National Ignition Facility (NIF) in California (see our exclusive tour, opposite page), where some 30 former Imperial PhD students are part of a team working to make fusion a viable energy source. NIF uses the world's most powerful lasers to indirectly heat and compress fusion fuel.

Another large-scale approach is the 'Z machine' at the Sandia National Laboratories in New Mexico, which uses brief pulses of electricity at around 50 trillion watts to indirectly heat and compress its fuel. In the past few years both of these facilities have been showing promising results with higher and higher output yields from their reactors. Yet they still don't produce more energy than they actually need to kick start them.

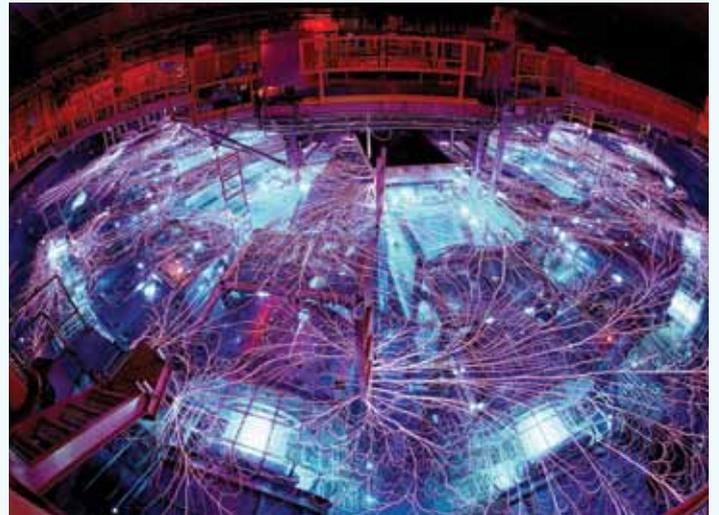
**“Compressing plasma is akin to taking a handful of jelly and squeezing as hard as you can.”**

Here at Imperial, researchers such as Jeremy Chittenden (Physics), Professor of Plasma Physics, look at data from NIF and Sandia and try to simulate the conditions by devising powerful computer models.

"It's about working out where we should focus our efforts to improve. That can only be done by analysing the data that comes out, including x-ray images and neutron counts, that have embedded in them signatures of asymmetry that cause the instability," says Jeremy.

"Unfortunately, nature is much better at finding ways to make things go wrong than we are at anticipating them."

Imperial also has its own lab scale experiment to probe extreme states of matter, dubbed MAGPIE. In a large room under the Blackett Laboratory, MAGPIE forces huge electrical currents through a web of wires several times



The Z machine facility at the Sandia National Laboratories in New Mexico



The MAGPIE facility at Imperial

thinner than human hair, which dissolve into plasma and are in turn compressed by magnetic fields, sending out a powerful pulse of x-rays. Studying those x-rays can help inform experiments at the larger Sandia Z machine facility.

Looking to the future, an international collaboration is currently building a €16 billion fusion reactor called ITER in the south of France.

Overseeing the UK's involvement is Professor Steve Cowley, CEO of the UK Atomic Energy Authority and part-time academic at Imperial (formerly Head of Plasma Physics).

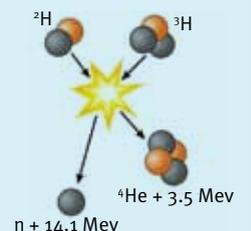
While it's been a difficult road, the dream of fusion energy is very much still alive and it seems Imperial's legacy in that is secure.

*Professor Chittenden will give a talk on fusion energy on 4 Feb (see back page for details)*



### Fusion reaction

In a fusion reaction atoms of hydrogen are squeezed together to form a helium nucleus. In the process, subatomic particles are expelled, such that the resulting mass is less than the sum of its original components. This extra mass is emitted as enormous quantities of energy – such that just one gram of fusion fuel has the potential to produce more energy than burning 10 tonnes of coal. The difficulty with fusion is that the hydrogen atoms that make up the fuel are both positively charged and therefore repel one another. Squeezing them together and keeping them there for long enough to extract energy is the central challenge of fusion.



## INSIDE A STAR FACTORY: Behind the scenes at the US National Ignition Facility

It's 08:30 AM, several days after New Year, and I'm in a vast, grey and white warehouse in California. There are rows of metal pipes above me and the place is quiet and empty, save for the man I'm here to meet, who is carrying something in his hand.

On closer inspection I see it's a charred tangle of metal and wires resembling burnt-out light bulb filaments. Later, I'm told that this is the remains of a cage that, for the briefest time, cradled a miniature star – ignited by those pipes, which are in fact amplifiers for the world's most powerful laser.

No, it's not the plot for a sci-fi B-movie – I'm actually in the National Ignition Facility (NIF) in Livermore and the scientist I'm here to see is Dr Mike Dunne, Director of Fusion Energy and Imperial alumnus (PhD Plasma Physics, 1982).

The NIF is arguably one of the most important science experiments on the planet, which, if successful, could permanently solve humanity's energy woes and alleviate global warming pressures. Fusion is the process that the sun uses to generate enormous quantities of energy (see box, opposite page). Scientists at NIF try to emulate this process by using 192 laser beams precisely focused with lab-grown crystals to heat a pellet of hydrogen isotope, no bigger than this letter 'a', inside a gold cylinder chamber. The laser beams hit the inner walls of the chamber, causing them to emit x-rays, which implodes the pellet, creating the necessary extreme conditions for the hydrogen atoms to fuse.

"There are people out there who will say: 'fusion energy is a hundred year problem; it'll never happen in our lifetimes'," says Dr John Edwards, Associate Director for Inertial

Confinement Fusion at NIF and another Imperial alumnus (PhD Plasma Physics, 1990). "It's a standing joke that fusion energy is 50 years away – and it will always be 50 years away."

Despite the skepticism held by some, the facility may be close to achieving 'ignition', the state at which the reaction of the fuel pellet produces more energy than the lasers need to kick start it. The drive to be the first team to achieve a self-sustaining fusion burn has attracted the world's leading systems engineers and plasma physicists (many from Imperial) to Livermore since the NIF was first conceptualized in the 1990s.

Mike is now confident in the system. He had hoped to reach the milestone last year, "but Mother Nature threw a few tricks in our way, and it's taking a little bit longer," he said. "But in some ways, that tells you all you need to know – people have been saying it's decades off, yet we were disappointed we didn't get there last year."

Results from last year's shots, as each experiment is dubbed, confirmed that the group's ever-evolving system model is inching closer than ever to the correct parameters of laser pulse-shape and fuel composition that will result in ignition.

To speed up the timeline to energy generation, Mike and his team have collaborated with engineers from the power industry to create a design for a steam turbine to capture heat from the reaction. This means that once ignition is reached, fewer hurdles will stand in the way of adapting the system to feed into an electrical grid.

Even after a prototype has been built and tested, changing the infrastructure to support a working reactor would be a huge financial investment. Edwards worries that the impact of current natural gas abundance on US political inclinations will delay the technology coming to fruition. "The issue is that, in the meantime, we're pumping all this carbon into the atmosphere, but

“What drives most people in the program is the potential impact this could have.”

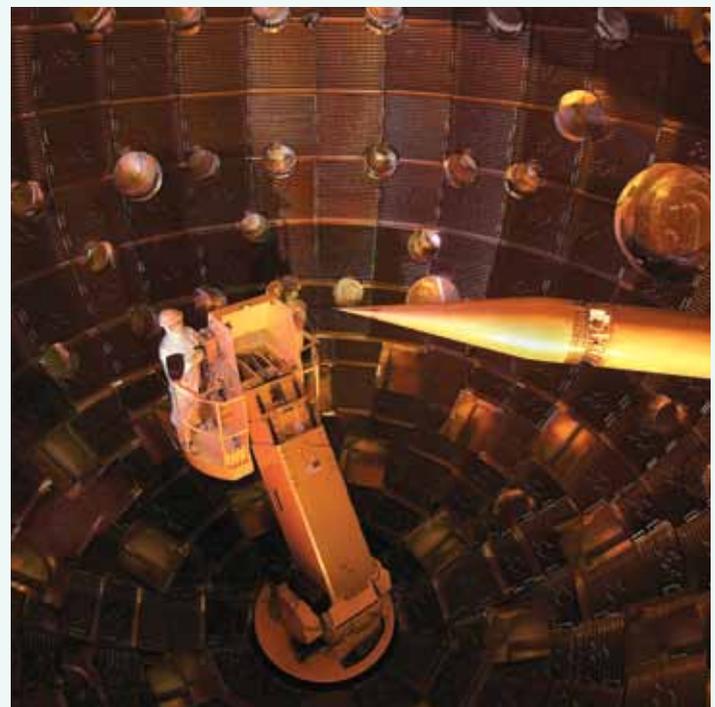
people aren't as concerned about that," he said. A strong involvement and lobbying by public individuals and organizations could turn the tide.

With the goal of reaching true fusion driving them forward, Mike and John draw on the skills earned during their time at Imperial. The similarity of the cultures – both relying on multi-expertise integration and teamwork – has made the trans-Atlantic jump easier for the facility's many Imperial transplants.

"It's driven by a lot of esoteric science and engineering, but ultimately what drives most people in the program is the potential impact this could have," said Dunne. "It's incredibly motivating."

—ALIJAH KOVNER FOR COMMUNICATIONS AND PUBLIC AFFAIRS

BELOW: The ignition chamber (top), where all the lasers converge and focus on the point of that pencil-like arm, which at its tip contains the gold cylinder (bottom, left) and the silver fuel pellet (bottom, right)



# The rhythm of research

With a career that began between the shelves of an antiquarian music shop, Chris Banks, Director of Library Services, would argue she's no conventional librarian.

While music may have been her first passion, Chris comes well prepared for the analytical and inquisitive environment of one of the world's foremost science institutions.

"My first ambition was actually to be a detective; I just really loved the idea of investigating things," says Chris. "When I was at school I saw a programme with H. C. Robbins-Landon, a Haydn Scholar, who was making historical deductions from manuscripts. It was this evidence-based approach to analysing music that inspired me to go on and study historical musicology."

No stranger to London, Chris spent 20 years at the British Library as a Junior Curator in their musical collections, eventually rising to Head of Reference and Research, responsible for the front facing subjects teams. But it was then that her career took a somewhat unexpected turn as she moved into Higher Education. After giving a lecture at the University of Aberdeen on a music manuscript, she was approached with the news that they were looking for a head librarian, and after learning about the role, decided to apply.

Having landed the job Chris then found herself in charge of spending £60million on building an innovative and architecturally striking new library, which was opened by the Queen and the Duke of Edinburgh in 2012. After spending nearly 6 years at Aberdeen she was then tempted back to London for a new challenge here at Imperial.

Starting in September last year, a major focus for Chris at Imperial will be the challenges of open access and research data management – something her background in special collections will help her to tackle.

"By looking at a music manuscript or a composer archive you can learn so much about the author through examining the physical remains of their creative process. We've got some of the best scientific brains in the world here at Imperial and there is so much in their research method and raw data – their creative process if you will – that we can learn from," she says.

Chris and her team are working in partnership with academics devising open access and research data management services that ensure data survival and availability for re-use in different ways.

Having overseen the creation of a brand new library whilst at Aberdeen, this issue of space is one Chris knows she will have to deal with here at the College too. But rather than being an issue of needing more space per se, it's how we use it, she says.

"Historically we have tended to build library space for one learning style – the quiet studious worker. The way in which students are working now though is very different and we see a whole range of styles, such as more group and interactive work. So it's about creating spaces where they can exist happily side by side."

Despite changes in the way students use libraries and the increasing focus on digital resources (92.4 percent of the Library acquisitions budget is spent on digital material), Chris doesn't think students will be shunning the traditional book anytime soon.

"What is really interesting is that many students actually prefer physical textbooks. You can mentally map out where information is on a page and picture it in the 3D space of the book in your mind. There are a lot of people who still really value that for certain kinds of reading and reference."

Aside from her day job Chris is also looking forward to being immersed in the musical life of the capital once again. "When I lived in London previously I was heavily involved in making music and sang with the London Philharmonic Choir. This time I'm deliberately not jumping back into that and focussing on being a consumer of music instead."

Although being just round the corner from the Royal Albert Hall, the call of the stage will surely always be there for Chris.

—JON NARCROSS, COMMUNICATIONS AND PUBLIC AFFAIRS



“Many students actually prefer physical textbooks. You can mentally map out where information is on a page and picture it in the 3D space of the book in your mind.”

## Q&A

### What are you reading currently?

The Dream Team Nightmare by Portia Tung. It's an e-book where the reader actually has to make decisions as they go through, which shapes the outcome of the story. I'm near the end now so I'll shortly find out if my decisions have resulted in disaster or not.

### Desert island disk?

It would probably be a bit of Bach. I've come late to Bach vocal music. For something that is just outrageously joyous I might pick something like the Christmas Oratorio. I had it on a lot over Christmas as I always put it on when I'm writing Christmas cards. It just puts you in the most fantastic mood.

### Tell us something your colleagues won't know

I sometimes play the didgeridoo. It came about after I heard a busker on the underground doing the most fantastic percussive performance playing along to the rhythm of the trains when they came through the station. I actually missed two trains just listening to him. So when I found a didgeridoo in a shop I thought I'd give it a go.



# inside\*

## story

### mini profile

## Stuart Whitelaw

Stuart Whitelaw has been coaching at Imperial College Boat Club for 6 years now, becoming Head of Rowing last year. He also attained a PhD in Mechanical Engineering (1997) from Imperial whilst rowing for Great Britain, and worked as a postdoctoral researcher in the Department.



### What does your current job entail?

It basically comes down to providing our rowers with an environment in which they can attain excellence. In order to achieve this we're obviously very fortunate to have the full support of the College in the form of funding, facilities and sporting freedom. In terms of my own day-to-day activities, it's very varied. Some mornings I'll be out there with the athletes on the water at 6am, or I might be writing training programmes and scheduling competitions.

### Do you feel the weight of responsibility given Imperial's great legacy in rowing?

No. You're there to do the best for the athletes with you at the time. People get caught up in the history but ultimately it's what you're doing now that counts. That said, we do have a picture of the great Bill Mason, who lifted Imperial to stardom, looking down on us from the ceiling of the boathouse!

### What does the immediate future hold for the Boat Club?

World domination! Or at least, to maintain and improve on the success we had last year. In addition one of the things we've been trying to do is to make rowing more inclusive, to widen the pyramid, thereby pushing the top athletes higher and bringing more people in at the bottom, and seeing how far they can get. That's about integration and making sure that everyone feels valued.

### Clearly with this role you have to eat, sleep and breathe rowing, but do you get time for anything else?

At the moment I have one day off in the week and work through the weekends. The time I have I spend with my wife and kids (although the kids still think I'm a human trampoline).



Photos and papers of Great War veteran Charles Nyburg, courtesy of Dr Anna Nyburg

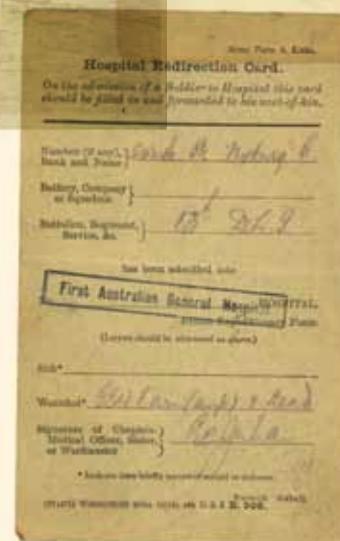


## Remembering the Great War

Dr Emily Mayhew, Research Associate in the Centre for Co-curricular Studies and professional historian, is currently working on a number of projects to mark the centenary commemorations of the First World War (1914–1918). She describes the first of these.

“Staff and students at the College participated both professionally and personally in the conflict, both at home and fighting on the fronts in Europe and beyond. Alongside a number of projects currently in planning to mark the achievements of the College's scientists and engineers towards the war effort, an exhibition will present a more personal point of view – that of the family members of current staff and students as they experienced the terrible conflict.

If you are a member of Imperial staff, past or present, or a student or alumnus, and you have archive material or artefacts from a family member who participated directly in the war, please consider loaning it to the exhibition. It could be a photograph, official military papers, letters from family to soldiers, medals, souvenirs – or indeed anything from the years 1914–1918 and beyond.



Through the exhibition we hope to show how everyone in the country was affected in a wide range of ways by the war and its aftermath.

As an example, Dr Anna Nyburg (Co-Curricular Studies) has loaned material relating to her grandfather, Charles Nyburg, who lost his left arm fighting in the Durham Light Infantry in 1917. A photograph shows how her father chose not to have a prosthetic arm to replace the limb he lost, as well as papers relating to his injury from the Army. The artefacts are all in excellent condition and provide moving personal testimony.

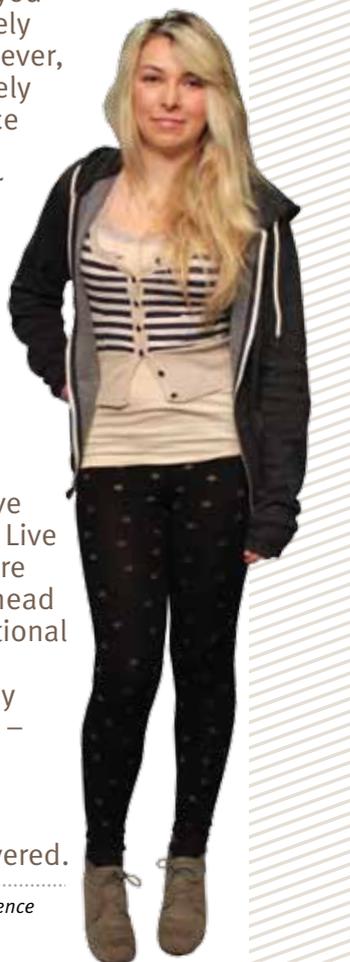
So please get checking your attics or boxes – there is plenty of time (our deadline for collection is September 2014) and we would like to get as wide a range of contributions as possible.”

For more details or to suggest an item or send an image for consideration contact Emily at: e.mayhew@imperial.ac.uk

Student blogger Emma on:  
**Citizen science**

If you're reading this blog you are probably at least vaguely interested in science. However, you are also more than likely of the view that real science is done at high levels by people who are very clever and very well trained (and who you might one day hope to become one of). These days though, citizen science projects are becoming more widespread, meaning that anyone can take part in a little bit of science for themselves. You might have seen the BBC's Stargazing Live programmes recently, where volunteers were asked to head online to help spot gravitational lenses from a bank of astronomical pictures. They were incredibly successful – over six and a half million images were classified and fifty candidates for gravitational lenses discovered.

For tips on getting involved in citizen science visit Emma's blog at: [bit.ly/1b3gyKu](http://bit.ly/1b3gyKu)



blog  
SPOT

## Inspiring the next generation

The awarding of the Nobel Prize for Physics for the postulation and subsequent confirmation of the Higgs Boson particle was one of the crowning achievements of British science last year – hopefully inspiring the next generation of physicists.

Indeed, a new prize for high achieving physics students, borrowing the Higgs name, will help contribute to that legacy.

One of the first winners, Lucy Willets-White, a first year Physics student at the college, will now visit the internationally renowned CERN facility in Switzerland to take part in its prestigious summer school.

The Higgs Prize for physics, which Lucy will share with St Andrews student Peter Rhodes, is awarded to two pupils who have shown outstanding performance in the Scottish Advanced Higher Physics exam.

On hearing of her success Lucy said: "I'm really interested in particle physics and learning about it first-hand should be a real help to my studies here at the Imperial."



The Higgs prize for physics was presented to the winners at a ceremony in December by Scottish First Minister, Alex Salmond

Professor Peter Higgs, who was jointly awarded the Nobel Prize said: "At my old school in Bristol, I was inspired by seeing the name of Paul Dirac on the Honours board. Dirac received the 1933 Nobel Prize in Physics for predicting anti-matter and, in particular, the positron. I know very well how exciting and amazing visits to CERN can be and I'm delighted to have my name associated with this prize. I hope it inspires young students today just as I was inspired by Dirac."

—JON NARCROSS, COMMUNICATIONS AND PUBLIC AFFAIRS

## Cliff hangers

Yosemite National Park is one of the most popular tourist destinations in the world, with over four million visitors flocking to see its spectacular scenery each year. Most are happy to amble along marked trails – but for others it holds a more menacing, irresistible challenge. With its towering granite cliff faces, it is one of the birthplaces of modern rock climbing and a proving ground for up and coming climbers.

So it was for a team of seven students from Imperial's Mountaineering Club who submitted a plan to the College's Exploration Board for a daring trip to take on some of those formidable monolithic peaks.

From the moment the proposal was accepted it was clear that it wasn't going to be a regular summer for those students.

"Our biggest challenge was the sheer exposure," recalled Ben Coope (Mechanical Engineering). "Nothing could have prepared us for the terror of hanging hundreds of feet above the ground being battered by the elements."

The seven adventurers spent between one month and six weeks in Yosemite, facing multiday ascents of between 400m and 1km – significantly higher than anything they had tried previously. Their group achieved their aim of successfully climbing three big wall routes in the valley between them: Washington Column, Half Dome and El Capitan.

The crowning achievement, though, went to the youngest and sole female member of the group, Jo Robbings (Physics), who successfully ascended 800m over 'The Nose' of El Capitan. To put the feat into perspective, the Shard, the tallest building in the EU, stands at just 305m.

"I personally feel as if I've only scratched the surface of the huge amount of potential within Yosemite, and I have a long list of routes I'd still love to tick off in the valley now that I've got some more experience in big walling," says Jo.

—DOMINIC MCDONAGH, COMMUNICATIONS AND PUBLIC AFFAIRS

“Our biggest challenge was the sheer exposure.”



Extreme selfie: Jo Robbings (Physics)

## 3D printing brings theory to life

Many people find interactive technology such as iPads can help them to learn more efficiently and better visualise difficult concepts.

Now a group from Imperial has taken this a step further by using 3D printing to create real models of abstract concepts in theoretical physics that students can actually reach out and touch.

In just eight hours and at the cost of around £12, the team of researchers and undergraduates created their own 8 cm<sup>3</sup> object based on a mathematical model that describes how forest fires can be started and how they eventually spread over time. Their work was published in the journal *European Physics Letters*.

Co-author of the study Dr Tim Evans (Physics) was inspired by a visit to the Victoria and Albert Museum where he came across the first ever 3D printed object the museum had acquired – a table with branched tree-like structures.

This led him to ask if complex systems, often found in theoretical physics, could be represented in a similar way. Complex systems are made up of many parts that interact



on many time and length scales and which show coherent behaviour and certain patterns on a large scale.

“The basic idea is simple. A 3D printer builds up its object in layers. So the height of the object can be thought of as time. The model will define at each point in time what the printer should print at one height. The result is a 3D object which shows how the mathematical model has evolved over time,” says Tim.

They have labelled the approach ‘Sculplexity’ – standing for sculptures of complexity. They believe it could be used to produce works of art based on science, or transform the way that ideas and concepts are presented and discussed within the scientific community.

—LAURA GALLAGHER, COMMUNICATIONS AND PUBLIC AFFAIRS



Jonathan Pritchard receiving the Rees Rawling Prize from Vice-Provost (Education) Professor Debra Humphris

## Fresh perspectives

As part of the new Perspectives in Education Lecture series at the College, the Educational Development Unit (EDU) hosted a special event on 19 December titled ‘Educational Research in an Imperial Context’. The event showcased some of the work of current and former students of the MEd in University Learning and Teaching course who are researching aspects of educational practice at Imperial, with presentations reflecting the range and diversity of work undertaken. Special programme prizes were also awarded to Drs Jonathan Pritchard, PG Cert (Rees Rawlings Prize for Best Portfolio); Stefan Buhmann, PG Diploma (Routledge Education Prize); and Sheraz Ahmad (MEd ULT prize for best dissertation).

Details about upcoming EDU events can be found at: <http://www3.imperial.ac.uk/edudev/networksandevents>



The musical theatre society performing Kiss me Kate

## The stage is set

Thesps, rock stars and musical maestros at the College can all look forward to performing in a venue more befitting of their talents, following the announcement of a quarter of a million pound grant to renovate the Union Concert Hall.

It comes thanks to an increase in the annual Harlington Grants Fund allocation from the usual £50,000 to around £300,000. The sum will also be used to improve the gym facilities of the Silwood Park Campus.

The renovation of the Concert Hall – which is home to many of the Union’s creative societies and famously hosted early gigs of the rock band Queen – will allow the space to host more ambitious productions, helping enhance the standard of performing arts at Imperial.

Imperial College Union President David Goldsmith said: “The Union Concert Hall is a space used by student groups throughout the year and this refurbishment is going to make a real difference to so many students.

“The Harlington Grants Fund is an important source of funding for many of our student groups and seeing it being used on a larger project like this is really exciting.”

—JON NARCROSS, COMMUNICATIONS AND PUBLIC AFFAIRS

# Show and tell

Vin Chauhan (Surgery and Cancer) is moving on after 45 years at Imperial – 30 of which he spent in the unique role of Curator of the Charing Cross Pathology Museum.

## Why do we have a pathology museum?

I like to think of it as a hands-on teaching facility for medical students, which was born out of the old Charing Cross Library. It is an invaluable archive of human disease; what doctors saw in the 18th, 19th and even the 20th century, we simply don't see now due to antibiotics and modern surgery. The only way for students to learn about certain diseases and their natural course is by seeing these specimens.

## What was the most interesting aspect of being curator?

Going back some years the forensic work stands out for me. On occasions I assisted forensic pathologists, detectives and coroners working on difficult cases. When the police found something unusual during an investigation, they would bring the specimen to me for preparation and further examination.

## What changes have you seen over the years?

Every effort is made for the students to use the Pathology Museum without contravening the Human Tissue Authority Regulations (which came into effect in 2004). It can be restrictive, but the regulations are there for a reason, which is understandable after high profile cases of tissue misuse, such as the Alder Hey organs scandal.



## What future do you see for museums like this?

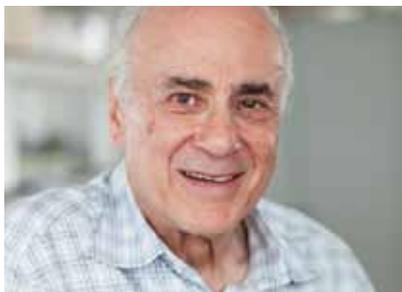
In my view you can't bring these museums into the 21st century by their very nature; we will never see some of these diseases again. Digitising the exhibits would not be an adequate solution either as students can be so focused on their iPads that they forget to discuss things. Here we examine the specimens from every angle, talk about the cause of the disease, the signs and symptoms, and the treatment.

## What are you going on to do now?

I would like to write a history of pathology museums and I'm collecting material on that now. But I will really miss this place; it was like my second home.

—TAMARA SZUCS, COMMUNICATIONS AND PUBLIC AFFAIRS

## obituaries



JOHN GOLDMAN

**Emeritus Professor John Goldman (Medicine), died on 24 December, aged 75, after a short illness. Professor Jane Apperley (Medicine) pays tribute to her colleague and friend.**

Born in London, John was educated at Westminster School and entered Magdalen College, Oxford, to read classics. Instead, he graduated with a BA in Psychology and Physiology then completed his medical training at St Bartholomew's Hospital. John went on to work at the Hammersmith Hospital, where he and a small team focussed on the care of patients with

haematological malignancies.

John's major disease interest was chronic myeloid leukaemia (CML), a disorder that was fatal at the time he began his research in 1975. He introduced autologous and allogeneic transplantation for CML and built the largest transplant practice in Europe. He later became interested in the use of targeted drugs for this disease and worked tirelessly to bring these into clinical practice, rendering transplant virtually redundant. He was rewarded by seeing this previously fatal disease become a chronic disorder with a normal life span.

John was a fine physician, dedicated to, and much loved by, his patients. He was erudite and a remarkable polymath – just as comfortable discussing Shakespeare, Greek mythology and Nelson as he was in managing leukaemia. Above all, he was a kind and generous man, approachable and encouraging to his junior colleagues, and always supportive of their research.



IAN BUTTERWORTH

**Emeritus Professor Ian Butterworth (Physics), died on 29 November; he would have been 83 on 3 December. His colleagues in the Department of Physics pay tribute.**

Ian obtained his PhD at the University of Manchester in Patrick Blackett's Cosmic Ray

group before moving to Imperial in 1958 to become the driving force behind the experimental High Energy Physics Group. He went on to become Head of the Department of Physics (1980–1983), Research Director of CERN (1983–1986), Principal of Queen Mary College (1986–1991) and a Distinguished Research Fellow at the College until his death.

He obtained international recognition for his work on the discovery and classification of mesonic and baryonic resonances, a crucial step towards the currently accepted quark model of hadronic matter.

During his long and distinguished career he was both respected and genuinely liked by very many colleagues around the world. Amongst the many tributes received were: 'Ian was such a power for good at Imperial'; 'He was so spirited and jolly' and 'A sad loss of the person who was a source of inspiration for me.'

Our thoughts are with his daughter, Jody and her husband Nicholas.

# Welcome

## new starters

Mr Edo Abraham, Civil and Environmental Engineering  
 Mr Mohammad Adabi, Materials  
 Ms Shea Addison, Medicine  
 Dr Saima Afaq, Public Health  
 Dr Carmen Agustin Pavon, Life Sciences  
 Mr Rhys Algar, Bioengineering  
 Dr Shivani Amdekar, Surgery & Cancer  
 Dr Nikolaos Angelopoulos, Surgery & Cancer  
 Dr Rossella Arcucci, EEE  
 Miss Danielle Ashworth, Public Health  
 Ms Louise Austin, Mechanical Engineering  
 Mr Ali Ayoub, Public Health  
 Mr Steven Baginski, Medicine  
 Dr Kirsten Barnicot, Medicine  
 Miss Kellianne Bartley, Business School  
 Ms Darina Bassil, Public Health  
 Miss Cristina Beltrami, NHLI  
 Dr Clare Berry, Public Health  
 Dr Fadil Bidmos, Medicine  
 Dr Ariadna Blanca Romero, Chemistry  
 Dr Olga Boderó Bahillo, Chemistry  
 Mr Robert Bradley, Life Sciences  
 Dr Avraham Braun, Physics  
 Dr Vassiliki Bravis, Medicine  
 Mr Andrew Brockman, Life Sciences  
 Ms Natalie Browne, Life Sciences  
 Miss Ashlee Bugno, Faculty of Natural Sciences  
 Mr Andrew Busuttil, Surgery & Cancer  
 Dr Yalini Chandramohan, Clinical Science  
 Mr Constantinos Charalambous, EEE  
 Dr Christopher Chen, Physics  
 Miss Yi Cheng, Bioengineering  
 Mr Gary Chow, Computing  
 Dr Daniel Colquitt, Mathematics  
 Miss Joanne Cooke, Aeronautics  
 Mr Andrew Coulson, Chemistry  
 Miss Julia Crean, Library  
 Dr Anish Cyriac, Chemistry  
 Dr Katherine Czys, Surgery & Cancer  
 Mr Thibault Dairay, Aeronautics  
 Mr Ian Davison, Estates Division  
 Dr Marco De Ambrogi, Medicine  
 Miss Derfogaíl Delcassian, Materials  
 Mr Florent Deledalle, Chemistry  
 Ms Karen Dhillon, Surgery & Cancer  
 Dr Carlo Di Franco, Physics  
 Dr Lorenzo Di Lucia, Centre for Environmental Policy

Mr Callum Dickson, Chemistry  
 Dr Charlotte Dodson, NHLI  
 Miss Catherine Edeam, Faculty of Medicine Centre  
 Dr Emmanuel Efika, Chemical Engineering  
 Miss Nasim Elahi, ESE  
 Dr Daniel Elliott, Chemistry  
 Mrs Amanda Ellis, Life Sciences  
 Ms Deborah Evanson, Communications and Public Affairs  
 Miss Cherelle Fairbairn, HR  
 Miss Jo Forsey, Surgery & Cancer  
 Dr Gregor Fuhrmann, Materials  
 Dr Andrea Gaglione, Faculty of Engineering  
 Dr Victoria Garcia Rohca, Materials  
 Mr Adam Gardner, Estates  
 Professor Stephen Garwood, Mechanical Engineering  
 Dr Theoni Georgiou, Materials  
 Mr Giorgio Geraci, Aeronautics  
 Mr Franco Giammaria, Aeronautics  
 Mr James Gilchrist, Materials  
 Mr Vladimir Gligorijevic, Computing  
 Mr Anthony Godfrey, Surgery & Cancer  
 Dr Kevin Gouder, Aeronautics  
 Mr Luis Gouveia Cunha Machedo Lemos, Sport and Leisure  
 Mrs Tracey Gregory, Medicine  
 Mr Thomas Grieves, Faculty of Medicine Centre  
 Professor Dorothy Griffiths, Business School  
 Miss Jiaping Gu, Civil and Environmental Engineering  
 Miss Srishti Gupta, Life Sciences  
 Mr Rajesh Gurung, Estates  
 Miss Rachel Harris, Medicine  
 Mr Matthew Harrison, Surgery & Cancer  
 Miss Alison Harrod, Surgery & Cancer  
 Ms Julie Hart, Surgery & Cancer  
 Miss Sarah Henderson, Surgery & Cancer  
 Dr Manuel Herrera Fernandez, Civil and Environmental Engineering  
 Miss Hanna Hirvonen, Public Health  
 Mr Nicholas Ho, Life Sciences  
 Miss Rachael Holmes, Climate KIC  
 Ms Rukshana Hoque, Medicine  
 Dr Christine-Maria Horejs, Materials  
 Miss Gizel Hulusi, Registry  
 Mr Eddie Hung, Computing  
 Dr Thomas Hutson, Medicine  
 Miss Frances Hyatt, IC Student Union  
 Mrs Carleen Iburguen, Faculty of Medicine Centre  
 Miss Yvette Ighorue, Public Health  
 Ms Julitta Iranek-Osmecka, Public Health  
 Dr Martin Jaere, Surgery & Cancer  
 Dr Sheba Jarvis, Surgery & Cancer  
 Mr Chengyang Jiao, Computing

Miss Riela Jones, Life Sciences  
 Ms Charlotte Jordan, Public Health  
 Dr Tea-Sung Jun, Materials  
 Dr Jasvinder Kandola, Medicine  
 Dr Sathiji Kathiresu Nagashwaran, Medicine  
 Dr Beri Kavukcuoglu, Materials  
 Miss Shodona Kettle, Public Health  
 Dr Bernadette Khoshaba, Surgery & Cancer  
 Mr Raphael Kim, Life Sciences  
 Mr Harry King, Reactor Centre  
 Dr Siva Krishnadasan, Chemistry  
 Dr Anurag Kulkarni, Medicine  
 Mr Christopher Kwan, EEE  
 Mr Xiaoran Lai, Mathematics  
 Dr Jagjeet Lally, School of Professional Development  
 Mr Peter Lally, Medicine  
 Miss Kathryn Lamb, Medicine  
 Miss Louise Le Cornu, Chemical Engineering  
 Dr Wonjun Lee, Chemistry  
 Mr Siwei Li, Materials  
 Ms Joanne Lo, Life Sciences  
 Mr Stephen Logan, Physics  
 Mr Sebastian Luczak, Catering Services  
 Mrs Milena Lukic, Surgery & Cancer  
 Mr Atesh Luximon, Catering Services  
 Mrs Nuala Lyons, Faculty of Natural Sciences  
 Ms Urvi Makwana, Faculty of Medicine Centre  
 Dr Jaime Martin Perez, Materials  
 Dr Richard Matthewman, ESE  
 Dr Andrew May, Surgery & Cancer  
 Miss Megan McIntosh, NHLI  
 Miss Shona McIntosh, Development  
 Mr James McKenzie, Surgery & Cancer  
 Mr Robert McKiernan, Life Sciences  
 Miss Yvonne McMeel, Medicine  
 Miss Katalin Mecseki, Physics  
 Mrs Rebecca Middleton, Faculty of Natural Sciences  
 Mr Vasco Miranda Carvalho, NHLI  
 Mr Joseph Mirza, Life Sciences  
 Miss Ella Mitchell, Library  
 Dr Mohamed Mohamed, Mechanical Engineering  
 Mr Barnaby Mollett, Careers  
 Dr Cecile Montgiraud, NHLI  
 Miss Zaneta Motkowicz, Business School  
 Dr Hani Muammar, EEE  
 Dr Babak Naimi, Life Sciences  
 Mr Mohammad Neishabouri, Computing  
 Mr Chun Ng, Computing  
 Miss Van Nguyen, Surgery & Cancer  
 Ms Sally Nhinh, Faculty of Medicine Centre  
 Dr Dorota Niedzialek, Physics  
 Mrs Shaeda Nourmand, Medicine

Miss Tess O'Neill, Communications and Public Affairs  
 Dr Rasha Osman, Computing  
 Mr William Otter, EEE  
 Mr Alex Page, International Office  
 Dr Renuka Palanicawandar, Medicine  
 Dr Anastasios Papazafeiropoulos, EEE  
 Dr Patricia Paracuellos Torrecilla, Life Sciences  
 Miss Sivylla Paraskevopoulou, EEE  
 Mr David Parrott, Registry  
 Dr Jonathan Passerat-Palmbach, Computing  
 Mr Dean Pateman, Registry  
 Mr Richard Patient, Outreach Office  
 Dr Niranjan Patra, Materials  
 Ms Shreela Pauliah, Medicine  
 Miss Loredana Pellegrino, Surgery & Cancer  
 Mr Filippo Perbellini, NHLI  
 Mr Matthew Percy, Medicine  
 Mr John Perry, College Headquarters  
 Mr Antoni Perryman, IC Student Union  
 Dr Benjamin Pierce, Materials  
 Mr Pit Pillatsch, EEE  
 Mr Denis Politis, Mechanical Engineering  
 Mr Sanjay Purkayastha, Surgery & Cancer  
 Professor Andy Purvis, Life Sciences  
 Dr Ian Radcliffe, Bioengineering  
 Mrs Samia Rahman, Climate KIC  
 Dr Gopal Ramadas Dhondalay, NHLI  
 Dr Robert Rayner, Mechanical Engineering  
 Mr Max Rife, Mechanical Engineering  
 Dr Gareth Roberts, ESE  
 Miss Natalia Ruiz Gomez, Medicine  
 Dr Irene Sanchez Molina Santos, Chemistry  
 Dr Juna Sathian, Materials  
 Ms Nina Sedlakova, Faculty of Medicine Centre  
 Mr Antonis Sergis, Mechanical Engineering  
 Dr Daniele Sgandurra, Computing  
 Mr Peter Shadbolt, Physics  
 Dr Rachel Shaw, Surgery & Cancer  
 Mrs Neema Shivraj, Faculty of Medicine Centre  
 Mr Pavels Sinajevs, Catering Services  
 Dr Kamaljit Singh, ESE  
 Mr Samrat Singh, Public Health  
 Miss Emma Smith, Business School  
 Mr Oliver Smith, ICT  
 Mrs Paula Smith, Business School  
 Mr Jayesh Soobhujun, Catering Services  
 Mr Edward Spencer, ESE  
 Dr Eleni Stavrinidou, Materials  
 Ms Linda Stoner, Business School  
 Mr Matthew Stott, Medicine

Mr Ho Tang, Public Health  
 Mr Maxwell Taylor, Surgery & Cancer  
 Mr Nicholas Thapen, ISST  
 Dr Sudhin Thayyil, Medicine  
 Mrs Diane Thomason, Faculty of Medicine Centre  
 Mrs Jia Tian, ICT  
 Ms Sini Timonen, Surgery & Cancer  
 Dr David Tompsett, Chemistry  
 Dr Hilda Tsang, Public Health  
 Mr Hugo Turner, Public Health  
 Dr Jana Vandrovцова, Medicine  
 Mr Robert Verity, Public Health  
 Dr Jules Villard, Computing  
 Miss Rosemary Waldron, Communications and Public Affairs  
 Mr Christopher Wale, Public Health  
 Dr Alexander Walls, Faculty of Medicine Centre  
 Mr Duo Wang, Chemical Engineering  
 Dr James Ward, Surgery & Cancer  
 Miss Hannah Webb, Business School  
 Miss Sian Williams, Grantham Institute  
 Miss Gail Wilson, Communications and Public Affairs  
 Mr Benjamin Wood, Materials  
 Mr Peter Wright, NHLI  
 Mr Satoshi Yoshizaki, EEE  
 Dr Ioannis Zacharoudiou, Chemical Engineering  
 Mr Giovanni Zaninotto, Surgery & Cancer  
 Dr Jan Zemen, Physics  
 Dr Bao Zhang, Mechanical Engineering  
 Dr Zhen Zhang, Materials  
 Mr Zeeshan Zia, Computing

This data is supplied by HR and covers staff leaving the College during the period 28 November–15 January. This data was correct at the time of going to press. For Moving On, visit the online supplement at [www.imperial.ac.uk/reporter](http://www.imperial.ac.uk/reporter)

✉ Please send your images and/or comments about new starters, leavers and retirees to the Editor at [reporter@imperial.ac.uk](mailto:reporter@imperial.ac.uk)

The Editor reserves the right to edit or amend these as necessary.



4 FEBRUARY ▶ PUBLIC TALK  
**Thermonuclear fusion versus Murphy's Law**

Nuclear fusion powers the stars and could be an almost inexhaustible source of clean, renewable energy on Earth. Sixty years of research have revealed a number of pitfalls

that have so far prevented us from producing energy from fusion, but finding ways around these problems is edging us nearer to igniting a fusion plasma. In his inaugural lecture, Professor Jeremy Chittenden (Physics) asks, "Are we at last getting close?"



11 FEBRUARY ▶ PUBLIC TALK  
**Engineering and managing some of the world's busiest highways**

Highways have not stood still over the centuries, with a technology and infrastructure evolving to keep traffic moving as they become

increasingly busy. Find out what is in store for road users of the future in the 39th Annual Pavior's Lecture with Ginny Clarke, Director of Strategy and Planning at the UK's Highways Agency.

23 JANUARY ▶ SEMINAR  
**Augmented and virtual reality technologies**

Irek Starzyk (MSc Systems Engineering alumnus).



30 JANUARY ▶ SEMINAR  
**Innovation, insights and intrigue in a digital world**

Imperial Business Insights with Adam Warby, Avanade CEO.

6 FEBRUARY ▶ MUSIC  
**Britten String Quartet No 2**

Lunchtime recital performed by the Belcea Quartet.



23 JANUARY ▶ MUSIC  
**Brahms Piano Quartet No 2 in A**

Lunchtime recital by Touchwood.

29 JANUARY ▶ PUBLIC TALK  
**Randomness, dynamics and risk**

Professor Damiano Brigo (Mathematics) gives his inaugural lecture.



30 JANUARY ▶ SEMINAR  
**Science metaphor in multilingual translation**

Mark Shuttleworth (Centre for Co-curricular Studies).

11 FEBRUARY ▶ PUBLIC TALK  
**How to make it in Africa**

Rich in resources, but high in poverty. Panel discussion around Africa's entrepreneurial opportunities, challenges and success stories.



27 JANUARY ▶ SEMINAR  
**Antibiotic resistance and drug discovery**

Professor Laura Piddock, University of Birmingham.

29 JANUARY ▶ PUBLIC TALK  
**World Energy Outlook**

Dr Fatih Birol, Chief Economist at the International Energy Agency, presents this Grantham Institute special lecture.

30 JANUARY ▶ SEMINAR  
**Science metaphor in multilingual translation**

Mark Shuttleworth (Centre for Co-curricular Studies).

13 FEBRUARY ▶ SEMINAR  
**Big business and start-ups: competition or competitive advantage?**

Imperial Business Insights with Tim Kay, KPMG.

28 JANUARY ▶ PUBLIC TALK  
**Dark matter: dark energy: dark gravity**

Friends of Imperial event with Alan Heavens, Professor of Astrophysics (Physics).

29 JANUARY ▶ SEMINAR  
**Meet the President of IStructE**

Seminar with Nick Russell, newly appointed president of the Institution of Structural Engineers, and prize giving ceremony for the Imperial College London Design Competition.

4 FEBRUARY ▶ SEMINAR  
**A theory of generalized entropies**

Professor Henrik Jensen (Mathematics).

13 FEBRUARY ▶ SEMINAR  
**Darwin's silence**

Dr Stephen Webster (Centre for Co-Curricular Studies).

28 JANUARY ▶ ARTS  
**Artifact Soapbox**

Meet an animator, printmaker and sculptor and form a new sci-art collaboration.

4 FEBRUARY ▶ SEMINAR  
**The future of low carbon energy in the UK**

Imperial Business Insights with James Smith, Chair of the Carbon Trust.

20 FEBRUARY ▶ FRINGE  
**The Arts Experiment 2.0**

## take note

### A healthy end to January



Sport Imperial is giving you the chance to keep up those healthy New Year's resolutions... at least until the end of the month. As part of healthy living week (from 27–31 Jan), the team will be providing free fitness activities; massages; nutritional and postural advice; and body MOTs (including blood pressure and cholesterol checks) to all staff and students. There will also be health food offers available in catering outlets.

For more information see: [bit.ly/1aEBBGw](http://bit.ly/1aEBBGw)

## MEET THE READER



### Andrew Scheuber (Communications and Public Affairs), Strategic Communications Manger

**What are you doing in the picture?**  
 Enjoying the latest issue of Reporter on Melbourne's very sunny Brighton Beach on Boxing Day. It was my first time down under – the trip of a lifetime.

**What would you do if you were Editor of Reporter for a day?**  
 Change very little; it's already one of the finest magazines out there. (In unrelated news, the Editor of Reporter sits next to me.)

**Who would be your cover star?**  
 Whoever's behind the College Café's fantastic daily sandwich specials. Imperial's academics may have predicted the Higg's boson and developed new ways of treating diseases, but I bet they can't make a salt beef sandwich like the College Café.

Want to be the next reader featured in Reporter? Send in a picture of yourself to: [reporter@imperial.ac.uk](mailto:reporter@imperial.ac.uk)

## Stay in the loop

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