

REPORTER

#309

25 JANUARY 2019

SHARING STORIES OF IMPERIAL COLLEGE LONDON'S COMMUNITY



CRETE EXPECTATIONS 4

Student-led expedition across the Greek isle

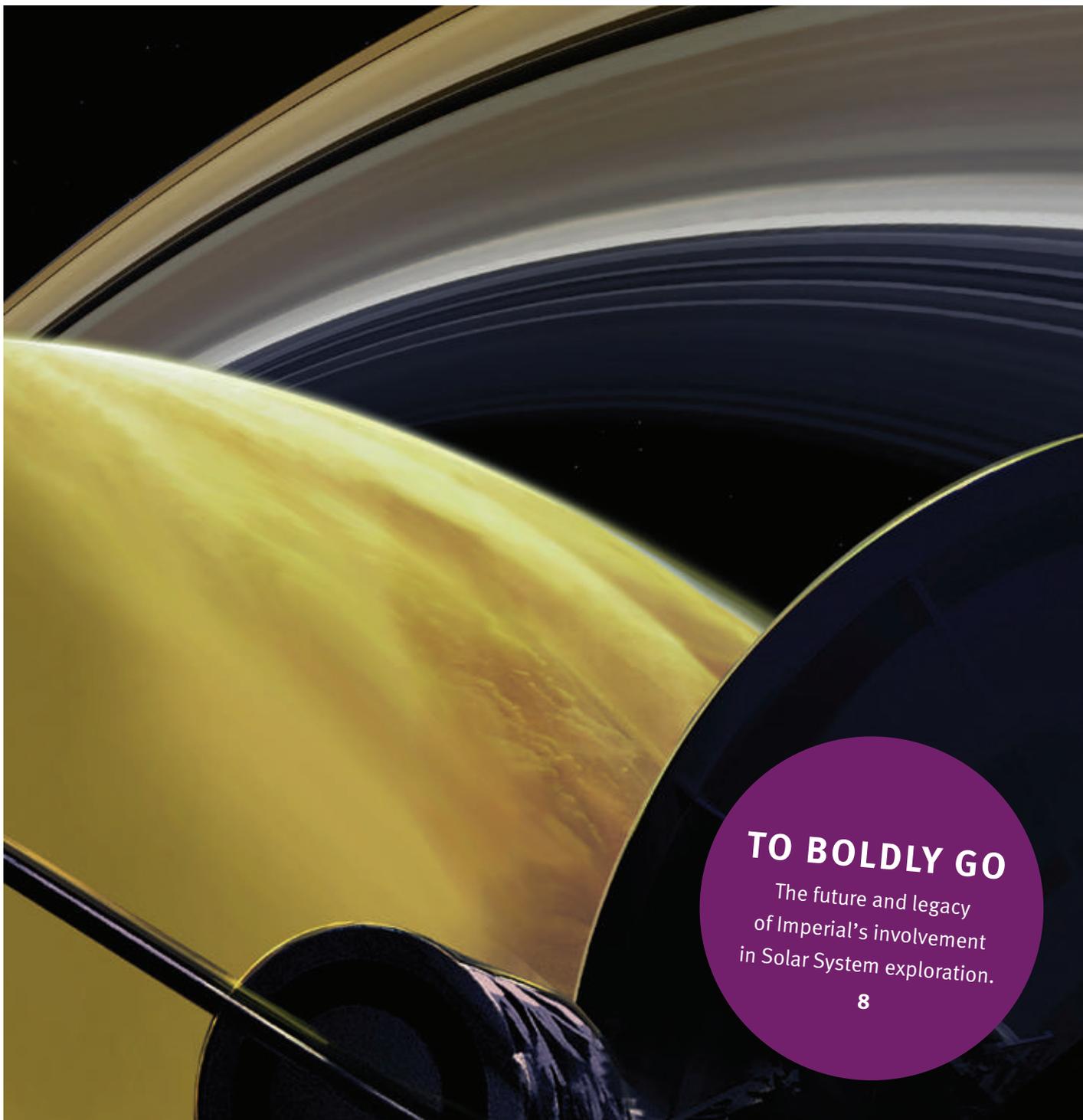
BRAINS TRUST 12

Professor Paul Matthews on the dementia fightback



SOULFUL MEDICINE 14

Dr Sonia Kumar and her team's bold new approach



TO BOLDLY GO

The future and legacy of Imperial's involvement in Solar System exploration.

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EDITOR'S LETTER

Evolving

One of my favourite sections of *Reporter* has always been the Long Servers column. It's a constant source of amazement to me how people continue to evolve in their roles at Imperial – for 20, 30, 40, 50 years and even longer in very rare cases. We've featured a physics technician who was here working on missions at the birth of the UK space industry in the late 60s; a pioneering professor who survived the holocaust and Nazi concentration camp; and a security guard who helped hide away a celebrity author who was on the run. Sadly, I won't be joining the ranks of the vaunted Long Servers, as I am leaving Imperial after a comparatively fleeting, but nonetheless eventful, six years. It's been an incredible journey, particularly in leading 55 issues of this great publication. I've stood on the shores of the freezing Thames in near darkness to meet our hardy student rowers on a dawn training session; been shoved through an MRI scanner at Hammersmith (without prior warning and with odd socks on); I've interviewed the incoming President, Provosts, Vice-Presidents/-Provosts and numerous Deans; reported on Head of State visits; delved into the mysteries of dark matter... not to mention the complexities of Operational Excellence. It's in Imperial's DNA to evolve and innovate, and I'm quite sure that *Reporter* will continue to do so beyond my tenure.



I'VE STOOD ON THE SHORES OF THE FREEZING THAMES IN NEAR DARKNESS; BEEN SHOVED THROUGH AN MRI SCANNER...

Andrew Czyzewski
EDITOR AT LARGE

Reporter is the voice of the staff community at Imperial College London and we're always keen to share success, both on and off campus. If you've a story you'd like included in a future edition, please contact Andrew Czyzewski.

▶ GET IN TOUCH: reporter@imperial.ac.uk

Imperial College London



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MEng Aeronautical Engineering with a Year in Industry students Elizabeth and Carlota on their year-long placement at Williams Racing, one of the world's leading Formula 1 teams.



IMPERIAL IN BRIEF

COLLEGE

NEW YEAR HONOURS

Neuroscientist Dr Henrietta Bowden-Jones and chemical engineer Professor Geoff Maitland have received an OBE and CBE, respectively in the New Year Honours. Dr Bowden-Jones is the founder and director of the National Problem Gambling Clinic – the first and only NHS multidisciplinary treatment centre for the treatment of problem gamblers. Professor Geoff Maitland is honoured for services to chemical engineering following a distinguished career where he drove connections between industry and academia – notably contributing to the development of affordable, high capacity, renewable low CO2 emission energy systems.



I WOULD LIKE TO DEDICATE THIS AWARD TO THE CHILDREN OF ADDICTED PARENTS IN RECOGNITION OF ALL THE SUFFERING THEY ARE EXPERIENCING AND OF THE HARM IT HAS CAUSED THEM. WE WILL CONTINUE FIGHTING THIS ILLNESS UNTIL SCIENCE LEADS US TO BE ABLE TO PREVENT IT.

Dr Henrietta Bowden-Jones, OBE

WHITE CITY

MP VISITS

Norman Lamb MP visited the International AIDS Vaccine Initiative (IAVI) Human Immunology Laboratory at Chelsea and Westminster Hospital in December. The Chair of the House of Commons Science and Technology Committee was hosted by Dr Julia Makinde as part of the Royal Society's pairing scheme, which links up politicians and policymakers with scientists to strengthen the bond between policymaking and scientific evidence.

Also in December, the new Universities and Science Minister Chris Skidmore MP met students and saw cutting-edge research at Imperial. President Alice Gast welcomed the Minister, going on to discuss the impact of entrepreneurship at Imperial on the wider economy.





An Imperial island odyssey

For one-month last September, a team of seven Imperial students trekked 300km of the E4 trail across the Greek island of Crete – spanning mountains, valleys and coastline. It was one of several student-led expeditions subsidised each year by the Imperial College Exploration Board. Here Niamh French, the team's journalist, shares extracts of her diaries.



Niamh French
BSC GEOLOGY,
YEAR 3

OUR TRAIL STARTED IN A SMALL historic village where we had camped in the grounds of a small orthodox church. We didn't use tents at any point of our trip – just sleeping bags under the stars. Our first day of hiking took us uphill for ten hours and left me aching in every muscle. Until fellow expeditioner Yorgos helped me adjust my straps, the weight of my backpack made me feel like I was carrying a large child who tugged impatiently at my shoulders. I'd never done more than a day's hike before and the winding trail ahead was feeling increasingly daunting. As we walked deeper into the mountains, we encountered more and more majestic beauty. Canned food takes on a whole new character and splendour when you're in the wild with limited supplies.

We stopped at a water source, the first one of the many marked on the map that wasn't dried up. The lottery of water sources was to become a part of daily life,

and the maths of water rationing soon became instinctive. We drank gratefully from a small gap in a hose that leaked into an algae-filled trough.

We woke with the Sun and the next day took us scrambling down a steep slope on loose, jagged rocks. The path was poorly marked and played tricks on us. The solidarity and closeness that comes from hiking with people is unbeatable and the challenges of the trail were already bringing the team closer together. A constant backdrop of laughter, beautiful views and goats stayed with us for the entirety of the trail. That evening, we showered under rusty taps and spent hours cooking lentils and rice and talking together as the Sun set. We began a ritual of yoga sessions before bed time.

Each day we woke with the Sun. Our third day took us scrambling down a spectacular gorge and into



**A CONSTANT BACKDROP OF
LAUGHTER, BEAUTIFUL VIEWS
AND GOATS STAYED WITH US FOR
THE ENTIRETY OF THE TRAIL.**





a town where a Cretan wedding was happening, with traditional dress and accompanying swords worn by the guests. We ate a buffet of homemade food for dinner, provided by a welcoming elderly woman who joked with us as though we were old friends.

CRETAN HOSPITALITY

The people of Crete are unfailingly kind. A local woman brought us a gift of cheese and bread upon seeing us walk through her village and a few hours later, another woman offered Nikos her daughter's hand in marriage. Later along the trail we were to meet an elderly man who asked if we would like some walnuts and then spent half an hour whacking a tree with a stick to harvest them for us. We also met countless people who gave us shots of raki – a throat-searing local spirit and a welcoming gesture.

Our first week ended with a tough ascent to the famous, but remote, Kamares cave. Birds danced in the towering entrance and invited us to explore. We switched on our head torches and slipped into the narrow depths. The dark, coolness and confining walls of the cave made a stark contrast with the hot days in open air we had become accustomed to.

The next day we climbed to the top of Psiloritis (2,456m), the highest point in Crete. We could see the oceans to each side of the island and eagles soared around us. We had hoped to camp in a small stone house on the peak, but the water source had dead mice in it and we didn't have enough water to last without refilling. We descended the mountain and began a week of walking through mountain valleys.

Each region we passed through had its own local cheese pies and honey to try – consistently delicious.



HUMZAH STOOD OUT FROM THE TOURISTS BY WEARING HOMEMADE SANDALS CRAFTED FROM PLASTIC BOTTLES AND RIPPED-UP BAGS, A REPLACEMENT FOR THE FLIP-FLOPS HE LOST ON THE TRAIL.

We came across a tiny church with beautiful paintings from the 13th and 15th centuries adorning its walls.

Our map brought us along the very steep and poorly consolidated edges of a small gorge. Rocks tumbled out from beneath our feet as we walked, marking the path our bodies would take right down to the river bed if we were to fall to our death. There was no way we would make it to shelter before dark and another storm was predicted. We had to abandon the trail and wait for





two saviours to collect us in a van with a sheep skull rattling around in the front and drive us seat-less up a long winding road to shelter.

CLASH OF CULTURES

We followed a pretty gorge down from the highlands to the sea, our first taste of Cretan beach life. We hadn't seen any tourists in the mountains and were suddenly surrounded by more people speaking English and German than Greek. Humzah particularly stood out from the tourists by wearing homemade sandals crafted from plastic bottles and ripped-up bags, a replacement for the flip-flops he lost on the trail.

The next few days were extremely hot as we traced the coastline and refreshed ourselves with quick swim breaks. We camped out on Sweet Water beach, a cove paradise only reachable by ferry or a couple of hours hiking, where Carla repurposed her sleeping mat as a lilo to lie amongst the fish.

We headed back into the mountains via Samaria Gorge, where a special species of goats called Kri Kri live. They are far more beautiful than the eccentric, wild-eyed goats that we were used to. The views from the gorge were the best yet, spectacular rock walls guided us higher and higher until

we could see far over the island. We ascended through the clouds to a cosy mountain refuge to spend the night.

We woke up at 2am the next morning to night-hike to the top of Melindau, well above the clouds at 2133m. The cold set in as we got higher. The sun crept over the horizon as we crept over the summit, forming a sandwich of stars, clouds, distant city lights and mountains. The sky glowed every colour.

Nearing the end of our journey, we followed a dried river valley back down to the sea. As we hiked along the coast, we came upon the enclosed ruins of a town – now ruled by stray cats and goats, and a man praying on an ancient mosaic.

As we walked further West we were met by more and more tourists, finishing the trail on a beach that held more people than we had seen on the entire trail. We flew back to London a few days later and have now settled back into our lives of studying, washing daily and navigating crowded pavements instead of mountain trails. ●

Applications for the next round of Exploration Board funding are open to teams until 6 February 2019.

► bit.ly/reporter309-exploration

IMPERIAL ROCK SUPERGROUP

LEADER

Yorgos Chatzitheoklitos

MSci Geophysics, Year 3

EQUIPMENT MANAGER

Michail Chatzis

MEng Electrical and Electronic Engineering, Year 4

SUPPLIES MANAGER

Nikos Koukoulekidis

PhD Physics, Year 1

TRAINING MANAGER

Carla Huynh

BSc Geology, Year 3

GEOLOGIST

Humzah Qazilbash

BSc Geology, Year 3

PHOTOGRAPHER

Aidan Cunnington

MEng Mechanical Engineering, Year 3

JOURNALIST

Niamh French

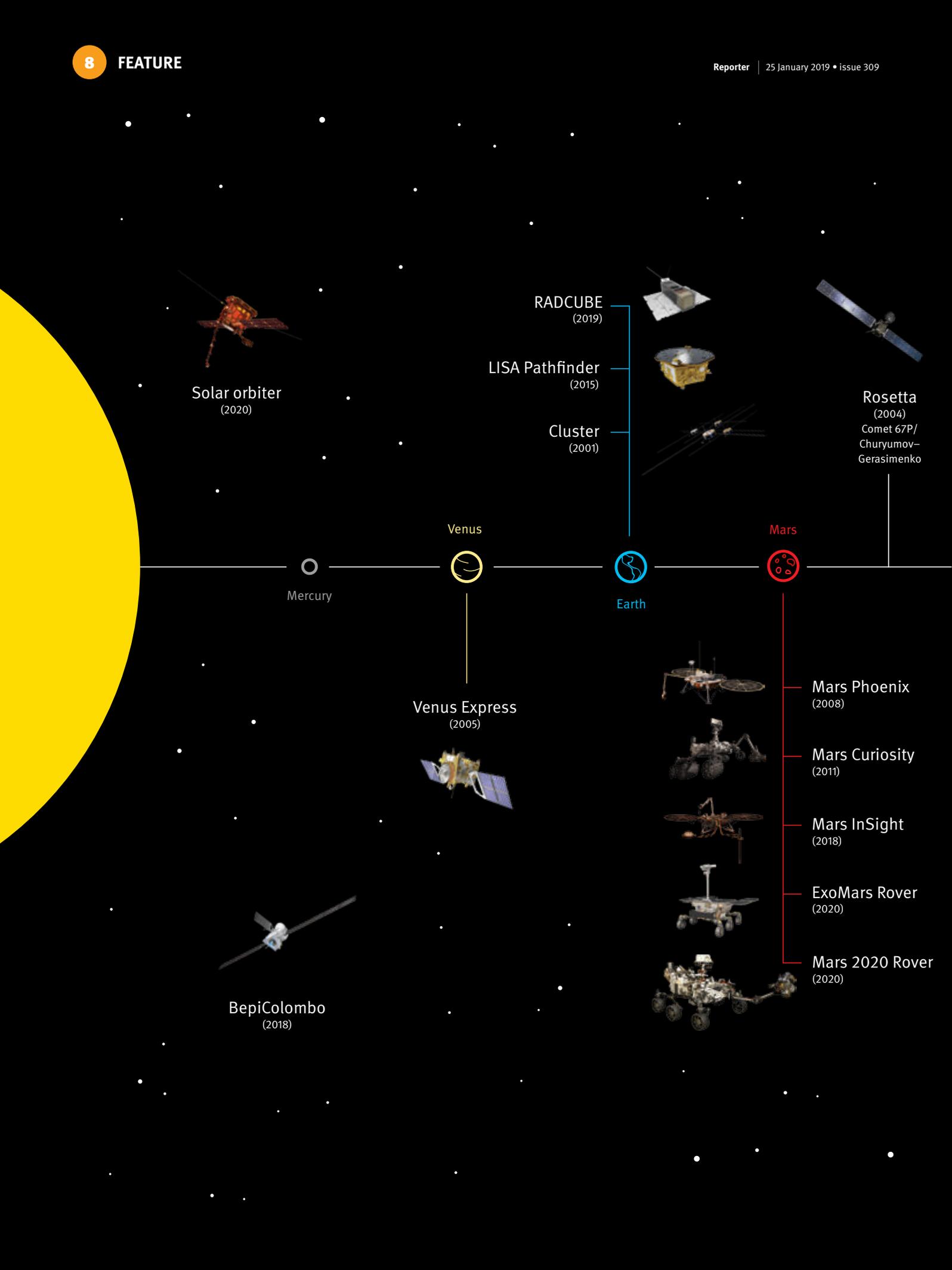
BSc Geology, Year 3

HISTORIAN

Hercules Chatzitheoklitos

MSc History of International Relations, (LSE, self-funded)





Solar orbiter
(2020)

RADCUBE
(2019)

LISA Pathfinder
(2015)

Cluster
(2001)

Rosetta
(2004)
Comet 67P/
Churyumov-
Gerasimenko

Mercury

Venus

Earth

Mars

Venus Express
(2005)

Mars Phoenix
(2008)

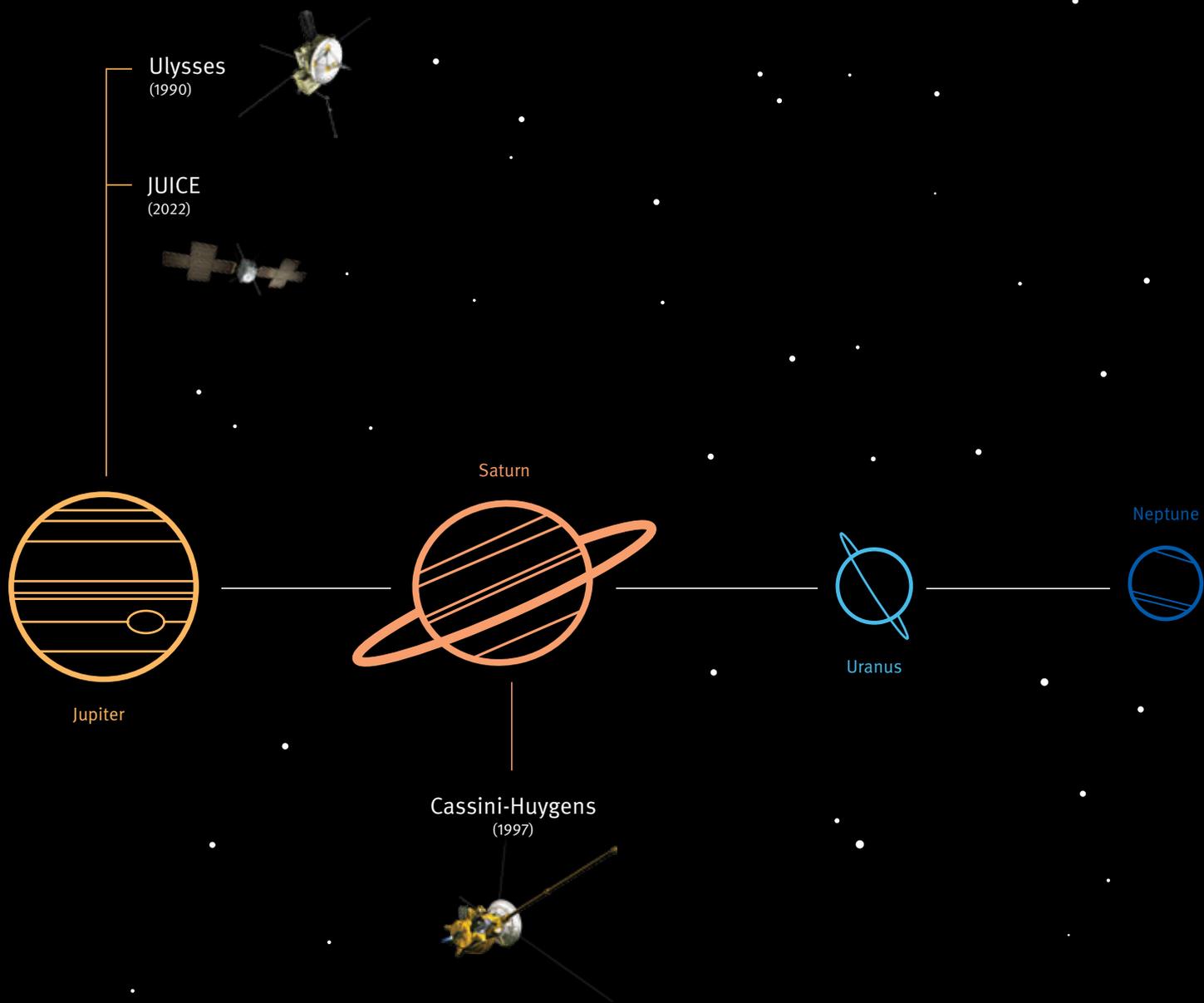
Mars Curiosity
(2011)

Mars InSight
(2018)

ExoMars Rover
(2020)

Mars 2020 Rover
(2020)

BepiColombo
(2018)



IMPERIAL IN SPACE

Our involvement in Solar System exploration.

Imperial has a long history of involvement in some of humanity's greatest space missions. Working with space agencies and fellow research institutions from across the planet, we've lent our skills to missions which seek to gain a deeper understanding of outer space – from the planets in our solar system, to far flung galaxies, and the vacuums in between. With Imperial's space exploration activities only looking to strengthen in the years ahead, we've brought together a visualisation of missions within our Solar System that our scientists have played a key role within.

For a breakdown of the missions we've been involved with, turn the page!

MISSIONS IN DETAIL

NAME	MISSION	STATUS	AGENCY
Venus Express (2005)	Venus Express was the first ESA mission to visit Earth's nearest planetary neighbour.	Mission ended (deorbited) December 2014.	ESA
Cluster (2001)	Cluster is a scientific mission of the ESA, with the aim to study the space environment of the Earth, including its magnetic shield.	Mission ended December 2018.	ESA
LISA Pathfinder (2015)	LISA Pathfinder is a gravitational wave observatory in space. On-board, 2-kg masses are kept in perfect free-fall below 10-13 g. It will open a new astronomical window on the universe, and test Einstein's theory of General Relativity with unprecedented accuracy.	Currently in Earth's orbit.	ESA
RADCUBE (2019)	RADCUBE is a CubeSat In-Orbit Demonstration mission led by C3S (Hungary) under the auspices of the ESA. The mission aims to form the world's first complete and comprehensive image of the radiation environment surrounding the Earth.	Set to launch in 2020.	C3S (Hungary) with the ESA
Mars Phoenix (2008)	Phoenix was a robotic spacecraft on a space exploration mission on Mars under the Mars Scout Program. Mission scientists used instruments aboard the lander to search for environments suitable for microbial life on Mars, and to research the history of water there.	The lander completed its mission in August 2008. The mission concluded on November 2008 after engineers were unable to re-contact the craft.	NASA
Mars Curiosity (2011)	Curiosity is a car-sized rover designed to explore Gale Crater on Mars as part of NASA's Mars Science Laboratory mission (MSL).	The rover is still operational.	NASA
Mars InSight (2018)	InSight (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) is a Mars lander – the first outer space robotic explorer to study in-depth the Red Planet's "inner space": its crust, mantle, and core.	Landed on Mars on 26 November 2018.	NASA
ExoMars Rover (2020)	ExoMars (Exobiology on Mars) is a two-part astrobiology project to search for evidence of life on Mars.	The second part of the mission is planned to launch in 2020, and to land a rover on the surface, supporting a science mission that is expected to last into 2022 or beyond.	ESA and Roscosmos (Russia)
Mars 2020 Rover (2020)	Mars 2020 is an as-yet-unnamed Mars rover mission by NASA's Mars Exploration Program. It will investigate the planet's surface geological processes and history, including the assessment of its past habitability and the potential for preservation of biosignatures within accessible geological materials.	Planned for launch in July 2020.	NASA
Ulysses (1990)	Ulysses was a three spacecraft CubeSat mission to study Space Weather by making multi-point measurements of the magnetic field and energetic ions and electrons in near-Earth space and imaging ring current particles.	Mission ended (switched off comms) June 2009.	ESA
JUICE (2022)	Jupiter ICy moons Explorer (JUICE) is a mission to Jupiter and its Galilean moons. The three-year mission will use the Jupiter system as an archetype for gas giants and their icy moons and to assess the habitability of the moons.	Aiming for a launch date of 2022.	ESA
Cassini-Huygens (1997)	Cassini was collaborative mission to send a probe to study the planet Saturn and its system, including its rings and natural satellites.	Mission ended 15 September 2017 on Saturn.	NASA, ESA, ASI (Italy)

IMPERIAL INVOLVEMENT

The Space Magnetometer Laboratory at Imperial provided part of the magnetometer instrument and contributed to data processing and science.

The Cluster Science Centre at Imperial is responsible for providing science tools to the UK Cluster community.

An Imperial team, led by Professor Timothy Sumner, has developed and manufactured hardware to maintain the electrical charge of the masses at zero using photoelectron emission under UV illumination. Our scientists are also part of the operations team carrying out six months of experiments to assess the performance of the spacecraft in-orbit.

Imperial will provide the magnetometer (PI Dr. Jonathan Eastwood) as part of the RAD-MAG payload led by MTA-EK (Hungary).

Professor Tom Pike was the only UK scientist to provide technology to help image and analyse Martian soil as part of the Phoenix Mission. Professor Pike worked on the microscope station that was included in the Phoenix payload.

Professor Sanjeev Gupta, from Imperial's Department of Earth Science and Engineering, is part of the mission. Every day he analyses data on the geology of Mars, which is beamed back from the Mars Science Laboratory mission's remote-controlled Curiosity rover.

Professor Tom Pike, from Imperial's Department of Electrical and Electronic Engineering, is part of the Mars Insight team. The Imperial team designed and fabricated silicon sensors as part of the Seismic Experiment for Interior Structure (SEIS), which detects tremors below the Martian surface.

Professor Sanjeev Gupta, from Imperial's Department of Earth Science and Engineering, is a co-investigator on the Pancam camera team on the ExoMars 2020 mission.

Professor Tom Pike is the co-investigator of Mars 2020's Mars Oxygen ISRU Experiment (MOXIE) payload. Professor Sanjeev Gupta, from Imperial's Department of Earth Science and Engineering is a collaborator on the Mastcam-Z camera team and a science team member.

The Space and Atmospheric Physics Group at Imperial had interests in two instruments on Ulysses: the magnetic field experiment and the Anisotropy Telescope.

Hardware for the Imperial College JUICE J-MAG – an outboard 3-axis fluxgate magnetometer (FGM) – will be provided by Imperial's Space Magnetometer Laboratory. The principal investigator is Professor Michele Dougherty, who led on the magnetometer analysis of the Cassini-Huygens mission.

The Imperial College Cassini Magnetometer (MAG) Group had overall responsibility of the magnetometer instrument on Cassini. The magnetometer recorded the direction and strength of magnetic fields around the spacecraft. Professor Michele Dougherty is principal investigator for the magnetometer (MAG) instrument onboard the spacecraft.

OTHER MISSIONS

Solar orbiter

Solar Orbiter is ESA's mission to explore the Sun and its connection into space. It is set to launch February 2020. Imperial is the lead on the magnetometer instrument (MAG).

BepiColombo

BepiColombo is a joint ESA-Japanese mission to the planet Mercury. It was launched in 2018, with an arrival at Mercury planned for December 2025. Imperial scientists contributed hardware to MERMAG, a 3 axis fluxgate magnetometer on the MPO satellite.

Rosetta

Rosetta was a space probe built by ESA to study comet 67P/Churyumov–Gerasimenko (67P), which ended its mission in September 2016. Imperial is part of the Rosetta Plasma Consortium (RPC).

Double Star

Double Star was a joint ESA-Chinese mission to explore the Earth's magnetosphere, which ended in October 2007. The Space Magnetometer Laboratory at Imperial provided hardware for the 3 axis fluxgate magnetometer on each satellite.

TRIO-CINEMA

TRIO-CINEMA is a three spacecraft CubeSat mission to study Space Weather. Imperial's Space Magnetometer Laboratory provided the magnetometer sensor (MAGIC).

MISSION PROPOSALS

THOR

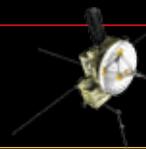
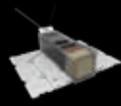
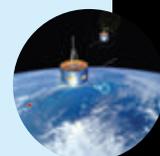
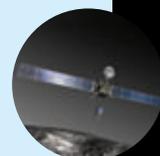
THOR is a proposed ESA mission to understand turbulent energy dissipation and particle acceleration in astrophysical plasmas. It has a planned launch date of 2025.

Cross-Scale/EIDO Scope

The multi-spacecraft Cross-Scale mission will measure the links between electron, ion and fluid dynamics within key plasma phenomena such as shocks and reconnection.

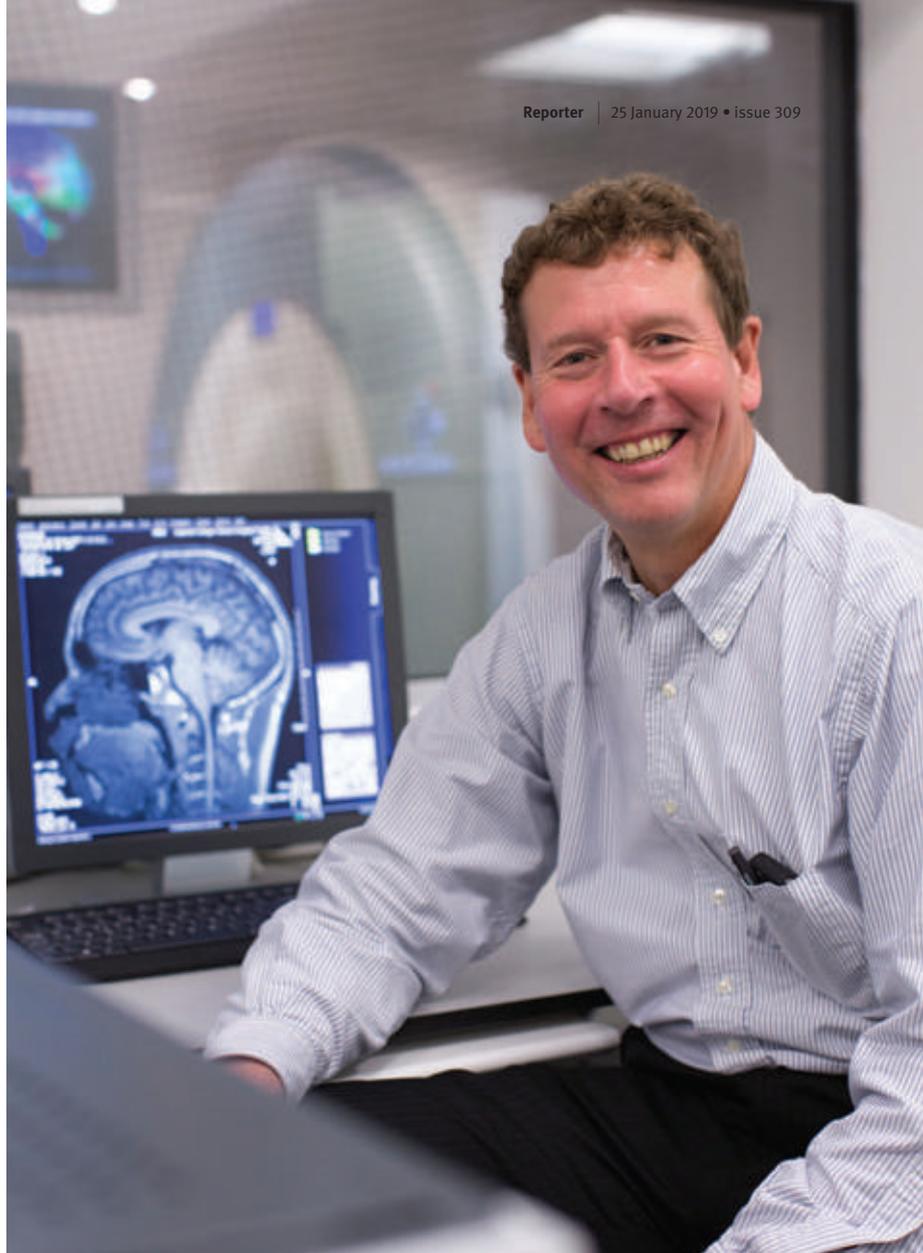
EChO

The Exoplanet Characterisation Observatory (EChO) will be the first dedicated mission to investigate exoplanetary atmospheres, addressing the suitability of those planets for life and placing our Solar System in context.



‘I guess I have been preparing for this my entire career’

Professor Paul Matthews talks about his journey in science and his role leading Imperial’s Dementia Research Institute.



You’ve had a very diverse career – spanning chemistry, neurology and genetics. Has this helped in keeping an open mind when facing problems?

When we’re looking at the brain we’re always looking at a tissue that is hidden from us. So when we look at molecular events, we need to have tools to extend our senses allowing us to look deeper or smaller than we see with our eyes or touch with our hands. Both of these challenges depend on the technology. Clinical scientists need to develop and use tools to extend our ability to observe nature – that is fundamental to advances across many areas of biological science. While I’ve been at many fine institutions, Imperial has been almost unique in the degree of access to technologies that can support these kind of discoveries – through its excellence in chemistry, engineering and computer science.

Are we seeing a convergence of techniques where imaging, genetics and minimally invasive techniques are starting to overlap and complement each other?

Technologies all start out being different in the form of their observation, but fundamentally they are all converging and attempting to understand the same phenomenon. For example, my colleague Nir Grossman is an electrical engineer who is interested in developing ways of stimulating deep inside the brain as a therapeutic intervention. The tools that he needs to assess that stimulation are the same ones that I use to assess function in the brain. The ways in which he is beginning to change the cells in the brain are related, in part, to the inflammation pathways I seek to study. While this is a specific example, it is illustrative of what is happening all over science – silos are starting to break down.



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Is the UK Dementia Research Institute (DRI) really gearing up now?

There's always a temptation to say that what one is doing at this moment in time is the most exciting thing one has ever done; but I think in this case it's genuinely true.

The Dementia Research Institute is something that in retrospect I guess I must have been preparing for my entire career, unknowingly. It's really about trying to pull together a group of people who would not have described themselves as dementia researchers, but who all have a remarkable set of insights and skills into how the brain works. This is an opportunity to create a centre at Imperial with neuro-expertise in sleep science; metabolomics; environmental exposure; technology; and inflammation, then bring them all together on the question of how environment and lifestyle influence our risk of dementia. I don't think there's any institution in the world that is bringing together exactly this combination of people and facilities. It has the potential to become transformational in its impact.

How do you see that playing out at Imperial's White City Campus, as the DRI moves into the Michael Uren Biomedical Engineering Research Hub from 2020?

Firstly, we have an entire floor for the Dementia Research Institute – intentionally planned without offices, as I want to encourage junior and senior people to interact more freely than they do now. Elsewhere in the Uren hub we will be working alongside bioengineering colleagues at the new centre of neurotechnology and, most likely the National Heart and Lung Institute – where we share a common agenda in trying to understand how vascular disease drives tissue degeneration in the brain for example. Looking at the entire Campus, we will also be close to chemistry colleagues at the adjoining Molecular Science Research Hub (MSRH) – a key partner in any translational biomedicine since they are the people who make the tools, materials, sensors and ultimately the molecules that become drugs. Looking even further down the line is the School of Public Health in White City and the work



it does with patients and communities. So the whole ecosystem and health pipeline in White City is coming into focus.

How is big data having an impact on neuroscience?

The essence of science is about asking questions and testing our beliefs in the world with empirical knowledge. Empirical knowledge needs data. In my opinion perhaps the biggest impact of big data on healthcare would arise from not paying quite so much attention to people who come to the clinic but actually going out and finding those people who aren't going to the clinics and helping them. With these sort of data we can immediately begin to illuminate that in silico. Then there are certain sorts of questions we could never answer by conventional means because we could never afford to do them, questions where we need tens of thousands or hundreds of thousands of people in order to arrive at the answers – that is where projects like the UK Biobank present opportunities for capturing data at scale.

Is there still room for small groups and individuals in neuroscience?

The role of individual creativity is never going to leave science. The thing about all these big projects is that most of them are fundamentally engineering projects – they are about creating a resource. That resource for example might be collecting data on half a million people for UK Biobank or about building a rocket to get to Mars. They involve elements of science but they are not themselves the science. Rather, the science lies in questions you ask of the UK biobank resource or what experiments are done when you get to Mars to make the mission worthwhile. This is where individual people are needed; thinking, asking questions and challenging the limits of ignorance. ●

PROFESSOR PAUL MATTHEWS OBE, FMedSci

After leaving Oxford University with a doctorate in Biochemistry, Paul Matthews completed his medical training at Stanford University in the US. It was upon his return to Oxford in the 1990s that he became interested in the brain, through the study of mitochondrial diseases, which can affect both muscle and brain. Paul's interest evolved into attempting to understand the molecular links between neuroinflammation and degeneration in the brain, particularly in the context of late life dementia. He now serves as Associate Director of the UK Dementia Research Institute at Imperial College London (part of a wider national network of Centres).

CURRENT APPOINTMENTS:

- Edmond and Lily Safra Chair of Translational Neuroscience and Therapeutics
- Head of the Department of Brain Sciences
- Director of the UK Dementia Research Institute
- Chair of the Imaging Working Group for UK Biobank

NOTABLE PREVIOUS APPOINTMENTS:

- Vice-president, Medicines Discovery and Development, GSK
- Head of the Department of Clinical Neurology, University of Oxford
- Director of the Oxford Centre for Functional Magnetic Imaging of the Brain

COMMENT



Dr Sonia Kumar
DIRECTOR OF
UNDERGRADUATE
PRIMARY CARE
EDUCATION

Sonia studied medicine at Kings College London and has worked as a GP in South London for over 15 years. Her team's approach to education has been acknowledged both internally, winning a number of the President's teaching awards and NHS awards – and externally, recently winning Collaborative Award for Teaching Excellence (CATE) – established by the Higher Education Academy (part of Universities UK)



THESE STUDENT-LED PROJECTS HAVE BEEN OUTSTANDING, DEMONSTRATING HOW TRUST AND SPACE WITHIN THE CURRICULUM DIRECTLY FEEDS STUDENT PASSION AND CREATIVITY.

Mind, body and soul

Our award-winning Undergraduate Primary Care Education Team is expanding the very definition of care and bringing social accountability into medical education. Dr Sonia Kumar recounts the highs and lows of the journey so far.

I'VE WORKED AS A GP IN SOME OF SOUTH London's most challenging areas for a number of years. In the past few months alone, there have been three tragedies in our community – three teenaged boys have lost their lives in fatal stabbings. I recall so clearly when I first came to face to face with this issue, as a GP, around ten years ago. Midway through a morning surgery our receptionist came in to see me, saying, 'just to give you the heads up, that boy's dad is coming in to see you next'. She was referring to a 15-year-old boy that had been stabbed by another teen gang on the local council housing estate the day before. He had died despite the senior partners frantic attempts at resuscitating him.

What followed, remains, to this day, one of the most powerful learning experiences of my life. The boy's father walked in, eyes swollen and he slumped in the chair opposite me. After some silence he put his hands out towards me, and I instinctively leant forward to hold his hands back. In the silence that followed, he started quietly reciting the Lord's Prayer, which we then recited together. We sat like this for some time, after which he got up and left, thanking me.

I'm not sure what words truly summarise what happened in this space, somehow the words of empathy and patient centredness doesn't do it justice. What I am sure did happen, was a deep connection between a doctor and a patient, an understanding that medicine is far more than just diagnosing and treating biological diseases as well as an unfailing desire to make whatever difference I was able to in that moment in time. What ended for that family in a tragic death is rooted in a series of complex psychosocial causes.

Medical education has a critical role in training future doctors who understand the complex nature of health and illness and the impact of societal inequity – and who are also

committed to improving the health outcomes for the communities they serve. This notion of social accountability is the epicentre of our team's vision, and it is this focal point that has directed our attention, energy and drive over the last few years.

Importantly, we believe social accountability 'starts at home' among our own team of academics, students, trainee doctors, administrative staff and managers. We work as an 'educational community of practice' and we are all accountable to each other – valuing and embracing our collective diversity and strengths.

There are over fifteen courses and projects that the team now leads across the MBBS degree. An example is the Community Action



Project (CAP) where medical students in year three of the MBBS degree undertake a ten week GP placement, identify a real-world problem within their local community and engage with key community stakeholders, patient and charity groups to design an intervention to address the challenge identified. These student-led projects have been outstanding, demonstrating how trust and space within the curriculum directly feeds student passion and creativity. Students in these projects have been working with homeless hostels to improve their access to healthcare, have delivered educational sessions and drop in health checks to local diverse communities and developing online resources to help with patient translation and health literacy.

The team is now a UK forerunner in developing longitudinal clerkships. Students are placed within the community working as ‘paraprofessionals’ learning through apprenticeship, actively contributing to patient care. The team’s work also involves outreach work with local primary and secondary schools and are working with Imperial College’s EDU and digital team to create open online (MOOCs) and face to face courses in coaching skills. Their educational research reach is expanding, collaborating externally with Sheffield, Swansea, UCL, Harvard Academy of Educators and Birbeck University.

We believe that education is one of most powerful tools we have to sustainably empower our students and society. If we can join together with our students, policy makers and local community in a shared vision, to direct both our education and research towards meeting a social obligation, we will move one step closer to creating leaders of the future with empathic hearts and wise socially responsible minds. ●



“For the first time I felt I was able to do something as a student and I wasn’t at University just waiting to become a doctor”
(Year 3 medical student)

TEACHING NOTES



Pathways to leadership

Dr Clemens Brechtelsbauer is the first appointee to a new senior role in the Learning and Teaching practitioner pathway. The trailblazing Chemical Engineer will take up the position of Director of Chemical Engineering Education and Imperial College Teaching Fellow. This new post is part of an expansion of leadership opportunities at Imperial for those who specialise in teaching and in research into higher education.

Golden graduate

Imperial medicine graduate Dr Jessica Walsh has received the top prize in the University of London Gold’s Medal Viva competition. Each year, every London-based medical school is invited to nominate a small number of newly graduated students to compete, from those who have obtained the highest number of merits and distinctions. “Initially, I didn’t get into medical school, but this only furthered my motivation and I studied a Biomedical Science degree at another university before applying to Imperial for medicine,” Jessica said.



Molecular movies

Two free interactive platforms that teachers could use to help students learn about molecular biology have been developed by researchers. The first is a free web-based molecular imaging program (EzMol), which is linked to an A-level tutorial on the structure of proteins and nucleic acids. The second is a free mobile game (BioBlox2D) based on docking molecules, which includes an educational quiz. EzMol was developed in the laboratory of Professor Michael Sternberg.

LONG SERVICE

Staff featured in this column have given many years of service to the College. Staff listed celebrate anniversaries during the period 01 November–31 December 2018. The data are supplied by HR and correct at the time of going to press.

30 YEARS

- Dr Janet De Wilde, Head of Postgraduate Professional Development, Graduate School
- Professor Stephen Durham, Professor of Allergy and Respiratory Medicine, National Heart and Lung Institute
- Professor Ian Hodkinson, Professor of Logic and Computation, Computing
- Shirley Line, Divisional Manager-Human Resources/Communications, Surgery and Cancer
- Emeritus Professor John MacDermot, Emeritus Chair of Clinical Pharmacology, Medicine
- Hilary McPhail, Research Assistant, Medicine
- Professor Irene Roberts, Visiting Professor, Medicine
- Samantha Symmonds, Postgraduate Education Manager, Earth Science and Engineering

40 YEARS

- Simon Bastians, Senior Technician, Teaching, Chemistry
- David Featherbe, Chief Teaching Technician, Life Sciences
- Anna Hikel, Undergraduate Office Administrator, Civil and Environmental Engineering
- Stephen Woodrow, AV Technician, Faculty of Medicine Centre

SPOTLIGHT

SHIRLEY LINE

30 YEARS



“ I really started my career at Imperial in 1979, while working as a Research Technician in Biochemistry at South Kensington. I took a career break in 1985 to raise my family and returned to Charing Cross and Westminster Medical School in December 1988, in an administrative role. The main forms of communication at that time, were either by telephone or dropping in to speak to someone in person – the use of email has since taken over our lives! Following the merger of Medical Schools in 1997 to form the Faculty of Medicine, I found myself working at South Kensington once again. I was the Divisional Finance Administrator for the Division of Biomedical Sciences housed in SAF – a wonderful new building developed on the exact site where some years previously, I used to picnic at lunchtime. In 2000, I moved to the Hammersmith Campus, as Divisional Finance Manager for the Division of Paediatrics, Obstetrics & Gynaecology.

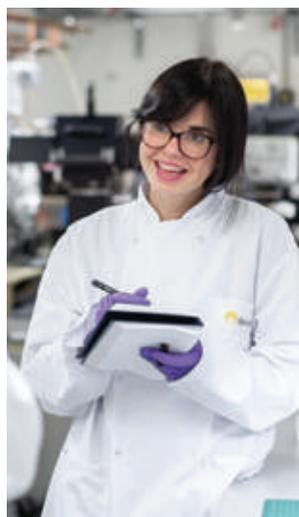
Over the years, I have had the pleasure of working with many inspiring role models. With their support and that of the Learning and Development Centre, I have advanced my qualifications and gained experiences that enabled me to develop my career and make use of the many opportunities presented to me. My time at the college has had its challenges, but it has been equally as rewarding – the combination of which, has resulted in my 30+ years of service. I cannot quite believe where the years have gone and I have more years behind me now than ahead. I look back with fond memories and look forward to whatever the future may hold.

HONOURS

NATURAL SCIENCES

Diversity champ

Imperial physicist and diversity champion, Dr Jess Wade, has been named as one of ‘ten people who mattered this year’ by science journal Nature. She is listed alongside top scientists for her efforts to raise the profile of underrepresented groups in science. Her work came to public notice earlier this year when the media picked up on the hundreds of Wikipedia pages on female scientists she has written, outside of her day job in Imperial’s Department of Physics



NATURAL SCIENCES

Refining Einstein

Imperial’s Professor Gustav Holzegel is a Finalist in the second annual Blavatnik Awards in the UK, winning US\$30,000. The Blavatnik Awards are the largest unrestricted cash prizes available exclusively to young scientists and engineers in the UK under the age of 42. Professor Holzegel (Mathematics) is cited for developing rigorous mathematical proofs of physics questions related to Einstein’s general theory of relativity.



IN MEMORIAM

Remembering Professor James Stirling

Professor James Stirling FRS, Imperial’s first Provost, passed away on Friday 9 November surrounded by family.

James Stirling joined Imperial following a distinguished academic career, where his work in theoretical particle physics resulted in more than 300 research papers, including some of the most highly cited of all time in the physical sciences.

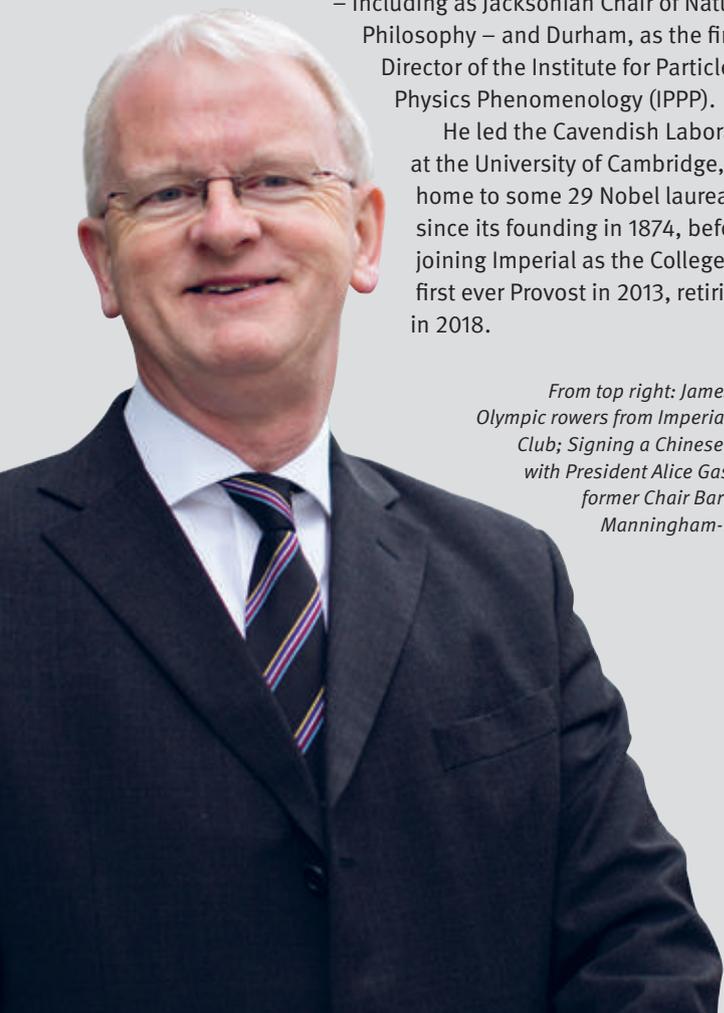
Professor Stirling’s work in quantum chromodynamics has been central to discoveries in physics and many of his calculational techniques have now been adopted as standard practice. His groundbreaking work in particle physics phenomenology led to his involvement in the MSTW collaboration studying the ‘parton’ structure of the proton with the Large Hadron Collider.

After a double-first and a distinction in Part III of the mathematical Tripos at Peterhouse, he took a PhD in the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge.

Professor Stirling’s research career included stints in the United States, at CERN, and, holding a series of academic and leadership roles, at the Universities of Cambridge – including as Jacksonian Chair of Natural Philosophy – and Durham, as the first Director of the Institute for Particle Physics Phenomenology (IPPP).

He led the Cavendish Laboratory at the University of Cambridge, home to some 29 Nobel laureates since its founding in 1874, before joining Imperial as the College’s first ever Provost in 2013, retiring in 2018.

From top right: James with Olympic rowers from Imperial Boat Club; Signing a Chinese MoU; with President Alice Gast and former Chair Baroness Manningham-Buller



A PROFOUND IMPACT ON THE LIFE AND WORK OF IMPERIAL

During his tenure at Imperial, Professor Stirling was responsible for Imperial’s core academic mission of education, research and innovation. His work on the College’s institutional culture, gender equality, valuing all staff, animal research processes, reforming tech transfer and enhancing research grant mechanisms is widely regarded as transformational.

Along with Professor Simone Buitendijk, he led the development of Imperial’s Learning and Teaching Strategy, including an £8 million investment for improving the College’s curriculum, student experience and online education. The College was recognised with a Gold award in the first Teaching Excellence Framework in 2017.

The Provost became known for championing the development and wellbeing of staff throughout the community, with a particular focus on marginalised and underrepresented groups.

Mental health and wellbeing became a top priority under Professor Stirling, as concerns arose including from the 2014 staff survey. The Provost implemented a series of changes including a network of 350 Mental Health First Aiders and 45 staff supporters, as well as a series of high-profile events for Mental Health Awareness Week.

In October 2018, Professor Stirling received Imperial’s highest honour – an honorary doctorate of science – during the College’s Commemoration Day celebrations in recognition of his outstanding contributions to physics and to the College. ●



REVIEW

Sir Paul Nurse on the origins of life

HAMMERSMITH AND WHITE CITY DISTINGUISHED LECTURE, 19 DECEMBER 2018

Addressing an audience which included Imperial President Professor Alice Gast and Professor Sir Magdi Yacoub, Sir Paul outlined an intricate picture of life that ranged from life's basic building blocks to complex biological systems.

A leading geneticist and cell biologist, Sir Paul Nurse is Director of The Francis Crick Institute and former President of the Royal Society.

He shared the 2001 Nobel Prize in Physiology or Medicine for the discovery of protein molecules that control the division of cells in the cell cycle.

The lecture was introduced by President Gast, who spoke of the “flourishing life sciences and public health ecosystem that is long-established in Hammersmith, and is now emerging at our new campus in White City”.

Sir Paul then took the audience through five “great ideas in biology” – from cells to information systems – which he said all intertwined to create complex life.

Describing some of the history behind great ideas, Sir Paul discussed the first documented examples of viewing single-



celled life, by ‘Father of Microscopy’ Antonie Van Leeuwenhoek. The 17th century scientist reportedly collected a scraping from between his teeth, and then viewed the teeming bacteria under his microscope.

Sir Paul went on to describe other colourful characters in history, including

Charles Darwin’s grandfather – Erasmus Darwin, who despite being a doctor was ‘not particular good at curing people’, and cut an oval in his table to enable him to move closer to his food.

Asked what propels advances, Sir Paul ended by stating: “We need diversity of thinking in science.”

REVIEW

Beaming in to White City

ROYAL INSTITUTION’S CHRISTMAS LECTURE PREVIEW, 18 DECEMBER 2019

White City residents got a preview of the Royal Institution’s famous Christmas Lectures as they were broadcast live at The Invention Rooms. It is the first time that the lectures have been streamed live in their 184 year history.

White City residents and local schoolchildren gathered in the recently opened Interaction Zone to watch Lecture Three, which unpicks the complex genetic variation that makes humans unique and how new technology is impacting our understanding of the genome. The Imperial College London event was hosted by Dr Colin McClure, Strategic Teaching Fellow from the College’s Department of Life Sciences, who supplemented the lecture with hands-on demonstrations and experiments as the lecture was beamed in.



For the first time ever Imperial's Festival will join up with the other institutions in South Kensington to form one giant fusion of the arts, science, learning and curiosity.

Coming up this Autumn at Imperial

Launching into 2019 with space pioneer Michele Dougherty followed by space-wear for astronauts at Imperial Lates

► SIGN UP FOR A
EVENTS FULL LISTING:
[www.imperial.ac.uk/
whats-on](http://www.imperial.ac.uk/whats-on)



31 JANUARY, 17.00–23.00

Night of Ideas: Facing our time

The 2019 Night of Ideas focuses on Europe and the environment, two issues central to our societies today. Featuring interviews with philosopher and public intellectual AC Grayling and a panel discussion with Imperial Professor, Joanna Haigh.

Institut français du Royaume-Uni
17 Queensberry Place, London SW7 2DT

6 FEBRUARY, 17.30

The Dennis Gabor Lecture



Sir Mark Walport, Chief Executive of UK Research and Innovation, discusses Gabor's "Inventing the Future" with the benefit of 55 years of hindsight.

408 EEE, South Kensington Campus

6 FEBRUARY, 19.00

Welcome to the quantum world

Postgraduate students will be presenting their take on the next big challenge of the quantum world: developing real world technologies from research.

Lecture Theatre G16, Sir Alexander Fleming Building, South Kensington Campus

21 FEBRUARY, 18.00–21.00

Imperial Lates: Smart Fashion

Space-wear for future astronauts, baby clothes that grow with your child, and workshops to print your own futuristic textiles are all on show to coincide with London Fashion Week.

South Kensington Campus



6 MARCH, 17.00

The Sir Ernst Chain Lecture 2019

Dr Richard Henderson, FRS, will deliver the Sir Ernst Chain Lecture, focusing on the electron cryomicroscopy revolution in structural biology.

Lecture Theatre G16, Sir Alexander Fleming Building, South Kensington Campus



HIGHLIGHTS



19 FEBRUARY, 17.30–18.30

The Schrödinger Lecture 2019

The Faculty of Natural Sciences' 31st Schrödinger Lecture will be given by Michele Dougherty, Professor of Space Physics, Head of the Department of Physics and Principal Investigator for the magnetometer instrument onboard the Cassini mission to Saturn and PI for the magnetometer for the Jupiter ICy moons Explorer (JUICE).

Great Hall, Sherfield Building, South Kensington

5 MARCH, 19.00

Eye catching: light and biological time

Embedded within our genes, and almost all life on Earth, are the instructions for a biological clock that marks the passage of approximately 24 hours. Russell Foster, Professor of Circadian Neuroscience at Oxford University and formerly Imperial, navigates this fascinating topic.

Lecture Theatre G16, Sir Alexander Fleming Building, South Kensington Campus

28–30 JUNE

The Great Exhibition Road Festival

For the first time ever Imperial's Festival will join up with all the other institutions in South Kensington to form one giant fusion of the arts, science, learning and curiosity.

South Kensington Campus





Your chance to speak up.

The Staff Survey opens on 25 February.

It's totally confidential, easy to complete and your feedback will improve working life at Imperial for everyone.

Make sure you're heard.

Staff Survey 2019
25 February – 15 March

imperial.ac.uk/staff-survey

TAKE NOTE

Free staff portraits photoshoot

If you would like to have your portrait photograph taken, either for your Professional Web Pages (PWPs) or other purposes, please sign up for a free photoshoot on Wednesday 6 February at the South Kensington Campus.

► **RESERVE YOUR PLACE:** bit.ly/new-photo-19

New gym space in Ethos

Sport Imperial is creating a brand new gym space on the ground floor of Ethos this year. The current seating/waiting area will be converted into a gym designed specifically for functional exercise. Use of this new gym will be included in existing gym memberships. Construction will begin in mid-March with completion in early July, with minor disruption to entrance points.



Introduction to the News Media event

Do you work with big data, patient data, genomics or AI and wish the media would do a better job of covering these areas? The Science Media Centre is running an Introduction to the News Media event on Thursday 31 January at the Wellcome Trust, from 13.00–17.00.

► **RESERVE YOUR PLACE:**
introduction@sciencemediacentre.org