IAS Institute of Advanced Studies

ADVANCING KNOWLEDGE

Annual review

2020

UNIVERSITY OF SURREY

About the Institute

Established in 2004, the Institute of Advanced Studies (IAS) at the University of Surrey sponsors workshops and Fellowships at the 'cutting edge' of science, engineering, social science and the humanities. Through this scheme the Institute fosters interdisciplinary collaborations and encourages a flow of international scholars to visit, enjoy their stay at Surrey and leave behind excellent ideas and innovations. Over the years our events and Fellowships have resulted in many research grants, new collaborations, journal articles and books, as well as much goodwill from all over the world. The Institute's Advisory Board advises on the strategy of the Institute and reviews and recommends which bids should be funded in the annual competition. The Institute is a member of the UK Consortium of Institutes of Advanced Studies and the international Consortium of Humanities Centers and Institutes.

ias.surrey.ac.uk

INSTITUTE DIRECTOR
Nigel Gilbert

Nigel Gilbert has a Distinguished Chair in Computational Social Science at the University of Surrey. He read for a first degree in Engineering and obtained his doctorate on the sociology of scientific knowledge from the University of Cambridge. His main research interests are processual theories of social phenomena, the development of computational sociology, and the methodology of computer simulation, especially agent-based modelling. As Director of the IAS, he is responsible for its development as a centre for international intellectual interchange.

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INSTITUTE COORDINATOR
Mirela Dumić

Mirela is responsible for the overall management of the Institute, including its annual grant competition and the Fellowship scheme. She supports the IAS Director in strategic activities and liaises with the Institute's Advisory Board, the University's academic community, external Fellows and similar institutes in the UK and abroad. She is also responsible for the Institute's publicity and dissemination of outcomes from events and Fellowships.

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INSTITUTE ADMINISTRATOR
Vicky Blamey

Vicki provides general administrative support to the Institute with a particular focus on the workshops that run each year following the Annual Competition. She is the main point of contact for workshop organisers and their administrators, providing support and assistance as required. In addition to her role for the IAS, Vicki is also the Department Administrator and Assistant to the Head of Department of Politics.

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Welcome

Welcome to the Institute of Advanced Studies' Annual Review

The Covid-19 pandemic has made this year an extraordinarily difficult one for many and, with most international travel and face-to-face meetings impossible, has brought particular challenges for the Institute of Advanced Studies (IAS).

Despite this, I'm proud to report that there have been some notable achievements in 2020. These include a 'ReproducibiliTea' virtual workshop which attracted around 180 participants from 10 time zones, and a six-month Fellowship for Dr Irene Zorzan (University of Padova) that led to a better understanding of cell cycles in disease. You can read in-depth reports on these two successes in this Annual Review.

We also bring you news of the 2019 IAS workshops, which have already produced significant outcomes. The 'Ab initio nuclear theory' workshop has led to two important publications and strongly influenced research proposals to the Science and Technology Facilities Council while, following the workshop on 'Pathways to in-vivo 3D dosimetry measurement', novel radiation detector technology has moved closer to commercialisation. Following on from our 2017-18 Fellowships, the last year has seen two important publications. Research on the perception of reclaimed homophobic language by Dr Andrea Carnaghi has appeared in the *Journal of Language and Social Psychology*, and Professor Geraint Lewis has recently published a paper on the origin of asymmetric dwarf galaxy distribution around andromeda in *Monthly Notices of the Royal Astronomical Society*.

In 2019 we welcomed four IAS Fellows to the University of Surrey, and inside you will find summaries of these Fellowships. Coming from leading universities in Spain, Brazil and China, the academics worked with their Surrey hosts to investigate how sleep has an impact on health, examine the intricacies of Chinese law, and explore the properties of stars.

This year has seen the launch of a new version of the IAS website (ias.surrey.ac.uk), which features a visually engaging design and easier navigation. On the website you can find out more about our competitions, events, Fellowships and publications, as well as accessing presentations and video interviews with past guest speakers.

You will also find details of the Institute's new Advisory Board members, who bring with them invaluable experience as leaders in their fields. I take this opportunity to welcome them and look forward to working with them.

As we plan for this academic year, we hope to re-organise our cancelled events and Fellowships from 2019-20 (depending on the evolving situation), and are pleased to be launching our Workshop Grant Competition for 2020-21 and Fellowship Grant Competition for 2021-22. If you would like to apply for either of these, you can find full details on page 19 of this Review.

In spite of the challenges of 2020, I feel positive about the impact the Institute is bringing. As we go to press, we are celebrating the publication of Dr Christopher Wiley's new book, *Researching and Writing on Contemporary Art and Artists*, which began life with discussions at an IAS workshop in 2017. Whatever the format of our events and Fellowships, I am certain that the IAS will continue to generate this type of high quality outcome in 2021 and beyond.

Professor Nigel Gilbert
IAS Director

Advisory Board

The members of the Advisory Board are drawn from those who hold Distinguished Chairs at the University of Surrey and, ex officio, the Associate Deans of Research and Innovation from the three Faculties. The Distinguished Chairs are recognised as leading figures in their fields, and have demonstrated academic excellence at an international level as well as in professional organisations and committees in their discipline. They have also made major contributions to the leadership of the University.

The Institute's Advisory Board advises on the strategy of the Institute and reviews and recommends which bids should be funded in the annual competition.

Faculty representatives

Professor Sabine Brown
Faculty of Arts and Social Sciences

Professor Monique Raats
Faculty of Health and Medical Sciences

Professor Julie Yeomans
Faculty of Engineering and Physical Sciences

Distinguished chairs

Jim Al-Khalili
Professor of Physics and Public Engagement in Science

Derk-Jan Dijk
Professor of Sleep and Physiology

Greville Corbett
Professor of Linguistics

Nigel Gilbert
Professor of Sociology

Josef Kittler
Professor of Machine Intelligence

Yaochu Jin
Professor of Computational Intelligence

Margaret Rayman
Professor of Nutritional Medicine

Debra Skene
Professor of Neuroendocrinology

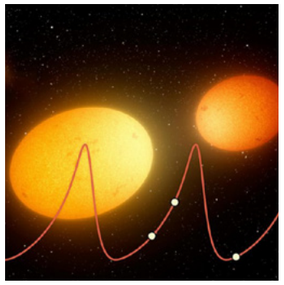
IAS workshop winners 2019-20

The annual IAS workshop competition attracted 15 entries which represented the diverse and fascinating work of researchers across the University. On this page we showcase the seven proposals which most impressed the judging panel.

A NEW WAY OF ANALYSING SLEEP

*Multilevel dynamics of human and animal sleep: mathematical models meet data**

With greater understanding about sleep and circadian rhythms coming from a range of different sources, there is now an opportunity to create new mathematical models that are predictive and include differences in genotype, physiology and environment. In this workshop, Professor Anne Skeldon (Department of Mathematics) and Professor Derk-Jan Dijk (Surrey Sleep Research Centre) will join with internationally leading experts from the USA, Switzerland, Germany, France, Belgium, Israel and the UK to examine the key challenges and opportunities for multiscale modelling and data sharing in the field.



SPOTLIGHT ON BINARY STARS

Pulsations in ntermediate-mass, massive and/or multiple stars
18 - 20 January 2021

Asteroseismology – the measurement of stellar luminosity variations by recent space missions to reveal important information about the size, mass and internal structures of stars – has largely neglected binary systems (twin stars), despite them representing half of all observed stars. Led by Dr Giovanni Mirouh (Department of Physics), this workshop will welcome experts from both the binary star and asteroseismology communities to help bridge the gap between the two fields and bring a deeper understanding of close interactions and their impact on stellar oscillations.

AN OPEN APPROACH TO SCIENCE

ReproducibiliTea annual meeting: leading the open and reproducible science revolution
29 May 2020

The ReproducibiliTea journal club is an early career researcher (ECR) initiative giving a platform to discussions on open and reproducible research. There are 75 clubs across 20 countries and the number keeps rising. This first ReproducibiliTea conference, organised by Joanne Kite and Marta Topor (School of Biosciences), aimed to empower ECRs in their efforts towards the improvement of research culture and integrity at their institutions. The programme included an open panel discussion and a leadership workshop. The results of the meeting will be published as open source reports and guidance.

MAKING CYBER SECURITY USER-FRIENDLY

*Behavioural science for usable security **

Motivating users to engage with cyber security mechanisms is a problem, particularly in an area such as electronic voting where secure systems employ sophisticated cryptography but rely on users to verify the votes they have cast. This workshop, led by Professor Steve Schneider (Department of Computer Science), brings together computer scientists and behavioural scientists to share their understanding of common challenges in developing usable security and explore how users' views can inform the design of more effective systems.

LEARNING TO GIVE FEEDBACK

Feedback literacy: from education to professional practice
12-13 January 2021

There's growing recognition that the true impact of feedback comes not from the comments made by a teacher or manager, but from the way students and employees engage with and implement these comments. 'Feedback literacy' – an emerging concept which aims to support more effective feedback processes – will be the subject of this open public symposium led by Dr Naomi Winstone (Director of the Surrey Institute of Education).

SLEEP, BUT NOT AS WE KNOW IT

*Making sleep: new insights for a new public health?**

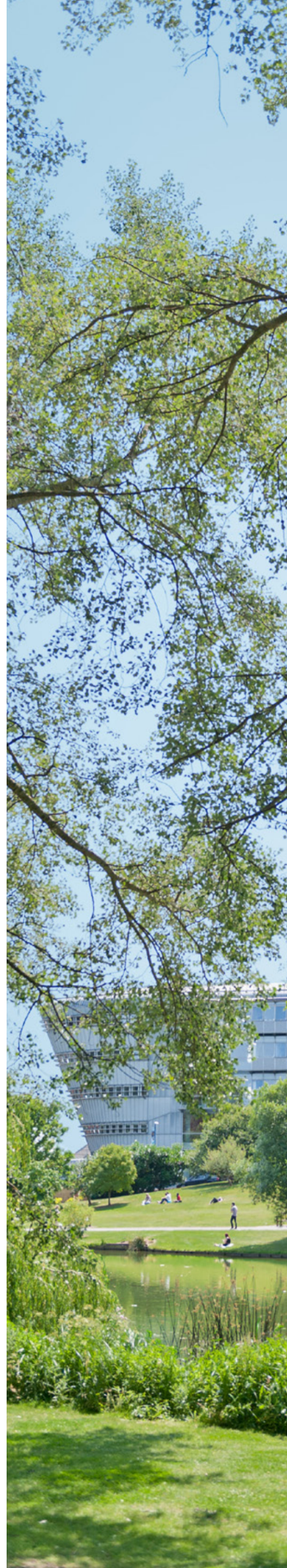
While the UK government soon plans to publish guidance on the amount of sleep we should get every night, this type of 'one size fits all' edict does not take into account how factors such as ethnicity, employment and socioeconomic status impact sleep. Technologies such as wearable devices and online CBT are also transforming the landscape of sleep. Academics in the School of Sociology led by Dr Robert Meadows believe that what's needed is a radical departure from traditional thinking. They will bring together academics and practitioners in this workshop to explore how we might work towards a new national sleep strategy.

WHEN UNDERSTANDING TRANSCENDS LANGUAGE

*Mutual intelligibility: language, culture, cognition**

Different but related languages often share many properties, enabling 'mutual intelligibility' – where a speaker of one language can use their native tongue to communicate with a speaker of another language. This workshop, led by Dr Nadezda Christopher (Surrey Morphology Group), will be the first to examine this phenomenon from a cultural and cognitive as well as a linguistic perspective, with the aim of identifying how theoretical and empirical research methods can be combined and used in the future.

* These workshops were postponed due to Covid-19 and are in the process of being rescheduled. For the latest information, please visit **ias.surrey.ac.uk**



Fellowship grant winners 2019-20

Dr Ciaran W Lahive
University of Groningen (The Netherlands)

Surrey host: Dr Madeleine Bussemaker, Department of Chemical and Process Engineering

An expert in green and sustainable chemistry, Dr Lahive will collaborate with Dr Bussemaker to explore the use of ultrasound and sonochemistry to process lignin – an abundant but recalcitrant organic polymer found within the cell walls of many plants. The aim of the Fellowship will be to demonstrate the potential for efficient and sustainable processing of this biomass, enabling the production of high-value chemicals which can be used in many applications such as polymers and pharmaceuticals.

Dr Rene Brouwer
University of Utrecht (The Netherlands)

Surrey host: Professor Francesco Giglio, School of Law

Dr Brouwer teaches law, philosophy and history, with a focus on Stoicism. The interaction between Roman law and Greek philosophy has had a lasting impact on modern law and philosophy. Dr Brower's recent work has thrown new light on this interaction. During his Fellowship, Dr Brouwer will present the results of his research as well as his new project on the origins of the notion of natural law. He will also explore avenues for collaborative research with Professor Giglio and other members of the School of Law.

Professor Grant Devilly
Griffith University (Australia)

Surrey host: Dr Robert Patton, School of Psychology

Professor Grant Devilly, an expert in the psychology of drug and alcohol practices, will visit Surrey with the aim of setting up a drug and alcohol team focused on violence prevention and psychological treatment. He will collaborate with Dr Patton and work closely with both Surrey Police and Queensland Police in Australia to research drug and alcohol use in night-time entertainment districts (NEDs), look at ways to reduce assaults in NEDs, and develop treatments for people with drug and alcohol preloading (the act of ingestion before transitioning to a public social gathering).

Assistant Professor Gurtina Besla
University of Arizona (USA)

Surrey host: Dr Noelia Noël, Department of Physics

Professor Besla will study the two most massive satellite galaxies orbiting the Milky Way – the Large and Small Magellanic Clouds. She will compare her own models of these galaxies against new data from a survey in which Dr Noël and her team at Surrey are involved. Building on a successful on-going collaboration, this research aims to understand the past history of these systems better in order to disentangle the formation of our own Galaxy.

Professor Christopher Mayhorn
North Carolina State University (USA)

Surrey host: Dr Nicola Carey, School of Health Sciences

Professor Mayhorn, an expert in applied cognitive psychology, will work with Dr Carey to develop a tool to assist caregivers and healthcare professionals in the early detection of infections in nursing homes. Conducting statistical analysis on multi-national data, they aim to establish a broad 5-year research agenda and stage a workshop involving international partners and stakeholders across the south east Academic Health Science Network.

Dr Thiago Nogueira
University of São Paulo (Brazil)

Surrey host: Professor Prashant Kumar, Department of Civil and Environmental Engineering

This Fellowship will tackle the global problem of air pollution which is estimated to contribute to at least 5m premature deaths a year worldwide. Dr Nogueira and Professor Kumar will exploit the potential of satellite images to conduct a study into the variations in the concentration of air pollution in South American cities. They also plan to develop a protocol which can be applied to other countries, publish multi-authored papers, and raise awareness through seminars and media articles.

Dr Irene Zorzan
University of Padova (Italy)

Surrey host: Dr Matteo Barberis, Department of Microbial Sciences

A researcher in Positive Systems Theory (an approach used in many spheres where variables represent non-negative quantities), Dr Irene Zorzan is collaborating with Dr Barberis to understand how the cell cycle network can be modulated through the identification of molecular designs that are responsible for its precise timing. In particular, they are looking for the occurrence of temporal patterns of enzymatic activities which regulate cell cycle progression in homogeneous and heterogeneous populations.

Artist in residence

Professor Dorita Hannah
University of Auckland and Aaelto University (New Zealand and Finland)

Surrey host: Dr Rachel Hann, Guildford School of Acting

Professor Hannah will bring her research and practice in 'performance design' to Surrey's Guildford School of Acting, complementing Dr Hann's research hub in this field. Drawing on her specialisms in architecture, spatial design, community practices and decolonial thinking, Professor Hannah will mentor staff and PhD students, help stage public research events and trial practical workshops

Reproducible research event is a virtual success

ReproducibiliTea: How can Early Career Researchers (ECRs) influence research culture and integrity? **29 May 2020**

When the Covid-19 outbreak put a temporary end to physical events, PhD students Marta Topor (Psychology) and Jo Kite (Biosciences) decided to turn a setback into an opportunity and staged their ReproducibiliTea workshop virtually, attracting over 170 participants across 10 time zones.

Led by members of the Surrey ReproducibiliTea Society, the event aimed to create a platform for discussion about how research can be made more open, transparent and reproducible – the objective of the global ReproducibiliTea movement which has over 90 branches worldwide.

Marta explained: "Our event took a very specific approach because it focused on the Early Career Researcher (ECR) perspective. While ECRs are often the ones asking for a more open approach to research, they are also at the most vulnerable stage of their careers."

When it became clear, in mid-March 2020, that the Covid-19 pandemic would prevent the planned two-day workshop at Surrey from taking place in May, the organisers quickly made the decision to move to an online event, to take place from 4 to 7pm on 29 May. This brought its own challenges, particularly in terms of ensuring that participants could take part safely and securely while being able to contribute to discussions.

Jo said: "We used Zoom for the presentations and panel discussion, but I think one of the most valuable things we did was to set up a Slack channel which we asked all attendees to register on. This gave people the chance to submit their questions in a fair way and also to continue discussions between themselves. It gave people a space to get more involved than they normally would."

The event organisers – including Roonak Rezvani, a PhD student in the Centre for Vision, Speech and Signal Processing, and Zhaoying Yu, an undergraduate Psychology student – decided to promote the event on Twitter, with a fantastic response. As well as PhD students and postdoctoral researchers, the audience included senior academics and representatives from organisations such as the Centre for Open Science and the UK Integrity Office.

The tone was set for the event with a talk by Anne Scheel, a PhD student at Eindhoven University of Technology in the Netherlands, entitled 'Vanguard and cannon fodder: ECRs at the front line of open science'. Anne spoke of the benefits of adopting open research techniques by ECRs who are usually the ones who are 'closest to the data', but also warned of the difficulties young researchers face in promoting new practices, and particularly the criticism they often face.

The second highlight of the event was a lively panel discussion between ECRs and senior academics. Taking part were Dr Amy Orben (Research Fellow, University of Cambridge), Dr Jessica Butler (Research Fellow, Aberdeen Centre for Health Data Science), Ben Bleasdale (Senior Policy and Advocacy Adviser at The Welcome Trust) and Professor Emily Farran (Department of Psychology, Surrey).

Discussion focused on how the move towards open research could be communicated to a wider audience of researchers, beyond those who already support these ideas, and the importance of securing institutional and organisational support to bring about lasting change. The panel also explored the challenges PhD students face, at a time when they are trying to establish themselves in their careers, if they work with supervisors who do not support open research practices.

One of the strongest conclusions was that ECRs and senior academics need to work together to improve the integrity of research at their institutions, while supervisors and PIs should be aware of the change in workflow that reproducible approaches bring and the vulnerability ECRs feel in trying to progress these initiatives. It was agreed that open, reproducible approaches should be incorporated into the training researchers receive, rather than being seen as an 'extracurricular activity' for ECRs.

Professor Farran, who is academic lead for research culture and integrity at Surrey, commented: "For ECRs, the extra time required to do open research can be perceived as a barrier to career progression. Encouraging 'quantity over quality' is bad for the ECR and bad for the field. This needs to be disincentivised, in place of slower, transparent research and the highly rigorous, high quality research that this engenders. Events like this are contributing to the rapidly changing research landscape. At Surrey, we are focused on embedding transparent and open research practices into the research culture."

The virtual ReproducibiliTea event has started a discussion which promises to continue. The team now plan to work with the UK's central ReproducibiliTea team to put together resources to help others organise similar events in the future. Meanwhile a recording of the event has been shared widely on Twitter, particularly across Asia Pacific and Australia, reaching an even broader audience.

Marta said: "I feel that we have been quite lucky because we've managed to make the most out of the situation. It's different to what we wanted at first, but it's actually turned out really, really well."

Marta Topor
(Psychology)

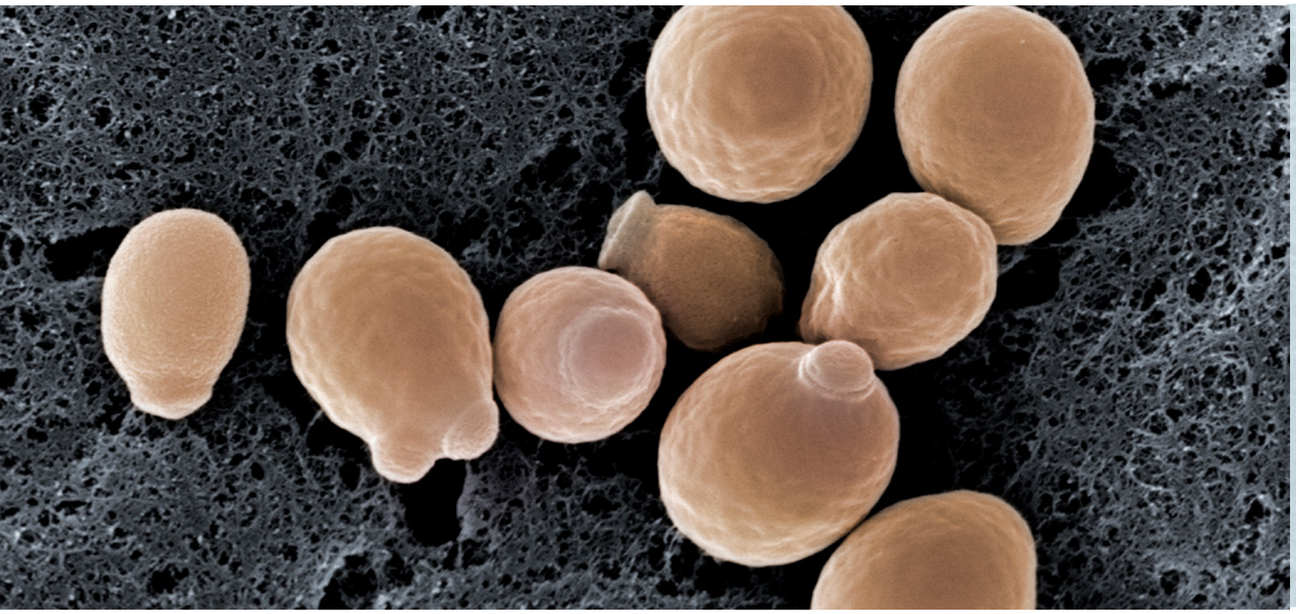
Jo Kite
(Biosciences)

Feedback from delegates about the ReproducibiliTea event:

"I'm beyond thankful for this opportunity as I would not otherwise have been able to attend. I think in future a virtual option should remain a possibility – I appreciate the efforts made through this time of crisis."

"Really great opportunity to hear from so many people involved in taking open science further. As a PhD student a lot that was discussed resonated with me and it is very reassuring to see that these concerns around vulnerability and extra time and effort are shared and acknowledged more widely."

"Having the slack channel for asking questions worked really well and the voting system made it fair and avoided common issues in real life conferences like one or two senior people dominating question asking."



A conversation with Fellow Dr Irene Zorzan

Biology and engineering combine to help us understand cell proliferation

Dr Irene Zorzan's Fellowship at Surrey has been exceptionally fruitful despite occurring during the Covid-19 pandemic. The promising research results could contribute to the design of drugs, based on modes of cellular control, to inhibit cancer and other dysfunctional diseases.

Dr Zorzan, a researcher at the Department of Information Engineering at the University of Padova, arrived in the UK on 17 February for a six-month Fellowship, which was hosted by Dr Matteo Barberis, Reader in Systems Biology within Surrey's School of Biosciences and Medicine.

"The Covid situation was unexpected and quite difficult at the beginning," said Dr Zorzan. "However my family was safe at home and I was safe here in the UK. When the country went into lockdown, we quickly found a new way of working."

The aim of the Fellowship was to better understand how the cell cycle – the events spanning from genome duplication to cell division – is modulated by identifying the molecular designs which affect its precise timing. Starting from knowledge revealed by recent experiments with budding yeast cells (unicellular organisms which closely resemble human cells), Dr Zorzan built mathematical models which were then used to simulate the behaviour of the cells.

She explained: "We have been looking at the regulation which ensures that the cell cycle can proceed in the correct way. When this doesn't happen – when molecules are activated early or late in the cell cycle – these irregular patterns may be associated with cancer and other diseases in humans."

So could the research point to a way of predicting the development of cancer?

"I would put it the other way round," said Dr Barberis. "If we know that some of the molecules need to be activated at a specific but different time to others, it may be possible to develop a drug that can reset either group of molecules to activate correctly."

This exciting research project began with a conversation between Dr Zorzan and Dr Barberis at the International Synthetic and Systems Biology Summer School in Italy in 2018.

"Matteo told me about his visionary idea, which we discussed again when he visited my University for an invited lecture. He also informed me about the IAS Fellowship which seemed like a great opportunity to explore this area of research," said Dr Zorzan.

"The most important thing I've gained during the Fellowship has been discovering a new way of doing research. I come from an engineering background so I'm used to starting from a theoretical point of view. In Matteo's research group they start from the experimental evidence and use this to drive the development of mathematical models – which makes for stronger, more predictive models."

Fellow: Dr Irene Zorzan,
Department of Information Engineering, University of Padova, Italy

Surrey host: Dr Matteo Barberis,
Department of Microbial Sciences, Faculty of Health and Medical Sciences

"Having the opportunity to work in a multidisciplinary research group has been very enlightening. I've found out what biologists really need from engineers, and it wasn't exactly what I would have expected."

Despite researchers being unable to come to campus for a period of time, the impact of the pandemic on Dr Zorzan's research has been surprisingly small. Virtual team meetings have been held on a daily basis, both during the week and at the weekends and, luckily, the computer-based research has not required the team's presence in a lab.

"Meetings on Zoom are obviously not quite the same as being physically together so working has initially been slightly more difficult. However, the team spirit and efficiency that we quickly developed has given us the opportunity to challenge, in a positive way, our working dynamics. Overall, we have been very lucky," said Dr Zorzan.

Dr Zorzan is now finalising her research project, with some of the results due to be submitted by the end of 2020 for publication, while another related research paper is also in the pipeline. Research from the Fellowship will be part of a special issue of *Current Opinion in Systems Biology* (of which Dr Barberis is Editor-in-Chief), while there are also plans for Dr Zorzan to work with Dr Barberis on further collaborative projects currently at the grant application stage.

Dr Barberis concluded: "The past six months have been very intense and we have worked extremely hard. This is just the beginning of a long term collaboration between Irene and my research group. I'm glad to say that Covid hasn't stopped us – in fact it has stimulated us!"

"Having the opportunity to work in a multidisciplinary research group has been very enlightening. I've found out what biologists really need from engineers, and it wasn't exactly what I would have expected." – Dr Zorzan

"If we know that some of the molecules need to be activated at a specific but different time to others, it may be possible to develop a drug that can reset either group of molecule to activate correctly." – Dr Barberis

Highlights from our workshops 2018-19

THE IMPACT AND ETHICS OF INTERNATIONAL INTERVENTION

20 years after Kosovo: The prospects for and limits of international intervention
18-19 September 2019

Workshop organisers: Dr Alex Leveringhaus and Dr Nicholas Kitchen, Department of Politics

This workshop provided a space for academics and policy practitioners to reflect on NATO's war in Kosovo in 1999 and ask how interventionism has developed ever since. Co-organised by Surrey's Centre for International Intervention (cii) and the British International Studies Association's Responsibility to Protect (IR2P) working group, it also examined the success of Responsibility to Protect, and explored issues around the ethics of intervention. One of the highlights of the workshop was a keynote lecture by Professor Sir Lawrence Freedman whose work had an important impact on the Blair administration's position on 'liberal interventionism'. The event was generously supported by the Leverhulme Trust.

OUTCOMES

The event has enabled cii to re-launch and broaden its network which has included co-director Dr Alex Leveringhaus joining the organising committee of the IR2P working group. A follow-up event is now being planned on the role of social media and other technologies in mass atrocities.

"The conference offered a comprehensive forum in which nearly all facets of the debate on intervention were explored: historical, contemporary, practical, philosophical, empirical, and theoretical." – Dr Alex Leveringhaus

WHERE WILL NUCLEAR THEORY TAKE US NEXT?

Ab initio nuclear theory: From breakthroughs to applications
24-26 July 2019

Workshop organisers: Dr Arnau Rios and Dr Carlo Barbieri, Department of Physics

Ab initio theory (a method of describing nuclei using first-principles) has enabled many breakthroughs over the past decade but offers the potential to do much more. Coinciding with the International Nuclear Physics Conference 2019 in Glasgow and organised by Surrey's Nuclear Physics Group, this workshop gathered 35 leading scientists from around the world to identify the key steps forward in ab initio nuclear theory, with a focus on relevant global challenges. The event included 24 talks covering technical challenges such as precision frontier and mass number limits, and computational techniques, as well as future opportunities – notably in quantum computing.

OUTCOMES

The themes discussed at the workshop have had a strong influence on important research proposals to the Science and Technology Facilities Council, while the event has already led to the publication of two papers in *Physical Review Letters*.

"The conference highlighted recent progress in the field with an impressive selection of talks and speakers."- Andrea Idini (Lund, Sweden)

IMPROVING PRECISION IN TARGETING CANCER

Pathways to in-vivo 3D dosimetry measurements for adaptive radiation delivery
25-27 June 2019

Workshop organisers: Dr Annika Lohstroh and Dr Shakardokht Jafari, Department of Physics.

This workshop addressed a key challenge in radiotherapy: the highly accurate measurement of radiation doses to enable tumours to be treated effectively while sparing the surrounding healthy tissues. Supported by Surrey spin-off company TrueInvivo, which has pioneered dosimetry technology based on silica glass beads, the workshop welcomed 35 delegates representing 20 academic, healthcare and government institutions. International leaders spoke on advances in areas such as 3D printing and semiconductor based detectors, and the challenges that must be overcome to make the vision of 3D or even 4D in-vivo dosimetry measurements a reality, while the event also included an inspiring public engagement evening.

OUTCOMES

IAS Fellow Dr Ramin Jaberi has subsequently led workshops with a consortium which supports commercialisation of the radiation detector technology consisting of Surrey, the National Physical Laboratory, Royal Surrey County Hospital and Queen Alexandra Hospital in Portsmouth. The first clinical trials have now been completed and the consortium is looking at steps towards implementing the technology.

"It was exactly aligned with my research interests and it gave me the opportunity to meet other people with overlapping interests." - Delegate

DIGITAL TESTING TO ENHANCE HEALTH

Exploiting the potential of rapid diagnostic test technology and mobile connectivity for improved disease control
29-30 May 2019

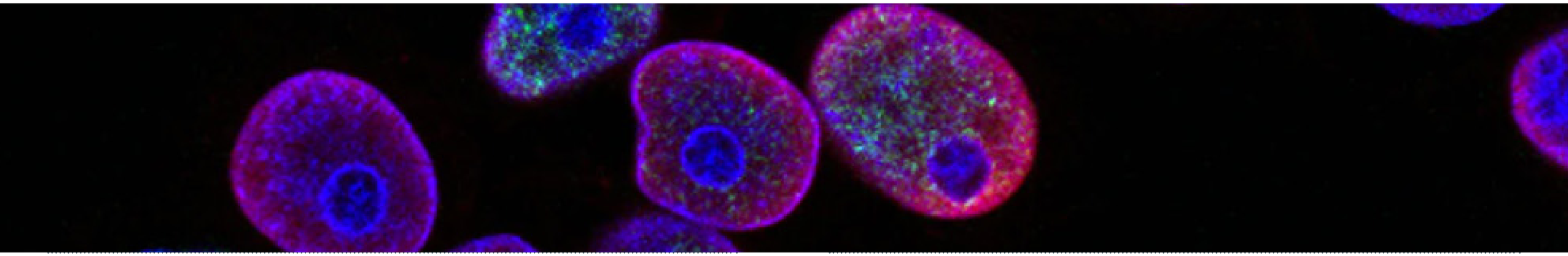
Workshop organisers: Dr Dan Horton, Professor Roberto La Ragione and Dr Jono Betts, School of Veterinary Medicine

Supported by the EPSRC i-sense programme, this workshop brought together 30 biologists, veterinarians, data managers and engineers to discuss the vast unexploited potential for combining recent advances in diagnostic test development with the latest digital technology to improve human and animal health. Speakers from across academia and industry addressed topics such as the implication of diagnostic tests in the livestock industries and the use of whole genome sequencing to identify bacterial targets for rapid diagnostic tests. There were also useful discussions around the technical and cultural barriers to the implementation of digital technologies.

OUTCOMES

Themes from the workshop have been incorporated into a literature review designed to set out clear priorities for research, highlight opportunities and barriers, and influence policy in the future. Surrey and the Pirbright Institute have also introduced a number of joint PhD studentships.

"The workshop was a potential catalyst for multiple collaborations between academia, industry and government reference laboratories." – Dr Daniel Horton



Highlights from our Fellowships 2018-19

HOW SLEEP IMPACTS HEALTH

Dr Felipe Beijamini, University of Fronteira Sul (Brazil)

An expert in the ecology of sleep and Associate Professor at the University of Fronteira's School of Biological Sciences, Dr Beijamini visited Surrey during June and November 2019 to work with his host Professor Malcolm von Schantz and his team within the School of Biosciences and Medicine. The aim of the Fellowship was to analyse data from the Baependi Heart Study and other sources to advance understanding of how timing and quality of sleep relates to cardiometabolic and mental health. Dr Beijamini presented a paper on the relationship between light exposure and sleep timing at the British Sleep Society Conference in November 2019. A manuscript describing the work performed during the Fellowship is currently under review for publication.

"The work developed during my Fellowship at IAS had substantial impact on my research career." – Dr Felipe Beijamini

THROWING LIGHT ON STAR CLUSTERS

Professor Alexandre Vazdekis, Instituto de Astrofisica de Canarias (Tenerife, Spain)

Professor Vazdekis, a reader in astronomy and astrophysics specialising in stellar evolution and galaxy evolution, visited Surrey in July 2019 to collaborate with Dr Noelia Noël within the Department of Physics. During the visit, Professor Vazdekis worked with academics and students to conduct a quantitative study of the stellar content of a set of star clusters, and then developed modelling software to analyse this stellar population. Anastasia Govzdenko, a Surrey undergraduate student on an ERASMUS+ placement at the Institute, is now leading a paper on the derived atmospheric parameter determinations for the stars in a specific cluster (NCG 6397), and will continue this work as part of her PhD thesis in the Netherlands. A major outcome of the Fellowship has been the forging of stronger links between Surrey and the Instituto de Astrofisica de Canaries, which includes plans for more students to spend a research placement year at the Institute.

"I enjoyed very interesting scientific discussions with other members of the Department of Physics." – Professor Alexandre Vazdekis

EXAMINING THE INTRICACIES OF CHINESE LAW

Professor Norman P Ho, Peking University (China)

One of the world's leading early career researchers in the field of transnational law, Professor Po visited Surrey's School of Law in June 2019, hosted by Dr Hrafn Asgeirsson. The highlight of the visit was Professor Ho's seminar, attended by members of the School and alumni, on 'Confucians are Legal Realists, too', based on new research conducted especially for the Fellowship. This led to an interesting Q&A discussion about how Confucian law should be characterised, and its role within modern law. There are now plans for an international conference on issues in comparative jurisprudence and comparative legal theory, with the aim of enabling a closer connection between Chinese (or more broadly, Asian) and Western legal theory.

"The School of Law at Surrey is unique: I cannot think of any other law school in the world that has such a diverse group of legal theorists as well as expertise and interest in Chinese law." – Professor Norman P Ho

WHAT HAPPENS WHEN STARS EXPLODE?

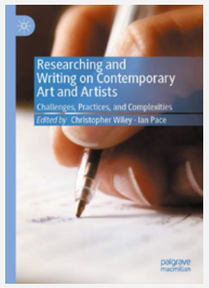
Dr Zhengwei Liu, Chinese Academy of Sciences (China)

Dr Liu, a Professor in the Yunnan Observatories at the Chinese Academy of Sciences, came to Surrey in September 2019 to work with host Dr Robert Izzard on simulations which explore the properties of exploding stars and the impact of supernova shock waves. This included novel approaches such as using the output of binary evolution calculations as the input of hydrodynamics modelling. During the Fellowship Dr Liu spent time exchanging ideas on computational hydrodynamics and supernova modelling with students and staff in the Department of Physics, and also gave a scientific talk on his work which led to some valuable discussions. One of the exciting outcomes of the Fellowship has been the introduction of an exchange programme for masters students between the two institutions.

"The Fellowship provided an excellent opportunity to enable us to establish the ongoing collaborations between the University of Surrey and the Yunnan Observatories, Chinese Academy of Sciences." – Dr Zhengwei Liu

Recent publications

Our Fellowships and workshops are often the catalyst for long-term collaborations between institutions and individuals, and research breakthroughs over many years. On this page we highlight just a few of the recent publications which have resulted from IAS funding.



RESEARCHING AND WRITING ON CONTEMPORARY ART AND ARTISTS CHALLENGES, PRACTICES, AND COMPLEXITIES

Edited by Christopher Wiley and Ian Pace

Palgrave Macmillan, 2020

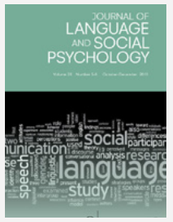
This volume was developed from the conference 'Writing About Contemporary Artists' held in October 2017

IMPROVING THE PERFORMANCE OF ELECTRONIC CIRCUITS

On her three visits to Surrey in 2018, IAS Fellow Dr Weining Man (San Francisco State University) worked with host Dr Marian Florescu to successfully demonstrate – for the first time – the excellent performance that can be achieved with hyperuniform disordered materials (HUDS) for photonic devices.

This work has resulted in:

- Publication of research paper, 'Hyperuniform disordered waveguides and devices for near infrared silicon photonics' in *Nature Scientific Reports* 9, 20338 (2019)
  Authors: M. M Milosevic, W. Man, G. Nahal, P. J Steinhardt, S. Torquato, P. M Chaikin, T. Amoah, B. Yu, R. A. Mullen, M. Florescu
- A funded EPSRC project with Etaphase, University of Washington and San Francisco State



THE PERCEPTION OF RECLAIMED HOMOPHOBIC LANGUAGE

Fellow: Dr Andrea Carnaghi, University of Trieste (Italy)
Host: Professor Peter Hegarty, Department of Psychology

Fasoli, F., Hegarty, P., & Carnaghi, A. (2019). Sounding gay, speaking as a "Fag": Auditory gaydar and the perception of reclaimed homophobic language. *Journal of Language and Social Psychology*, 38(5-6), 798-808.

THE ORIGIN OF ASYMMETRIC DWARF GALAXY DISTRIBUTION AROUND ANDROMEDA

Fellow: Professor Geraint Lewis, University of Sydney (Australia)
Host: Dr Michelle Collins, Department of Physics

Zhen Wan, William H Oliver, Geraint F Lewis, Justin I Read, Michelle L M Collins, On the origin of the asymmetric dwarf galaxy distribution around andromeda, *Monthly Notices of the Royal Astronomical Society*, Volume 492, Issue 1, February 2020, Pages 456–467

8332-0519

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