KING'S College LONDON

NANOSTRAND

THE PHOTONICS & NANOTECHNOLOGY RESEARCH GROUP
THE BIOLOGICAL PHYSICS & SOFT MATTER GROUP
REVIEW OF 2021

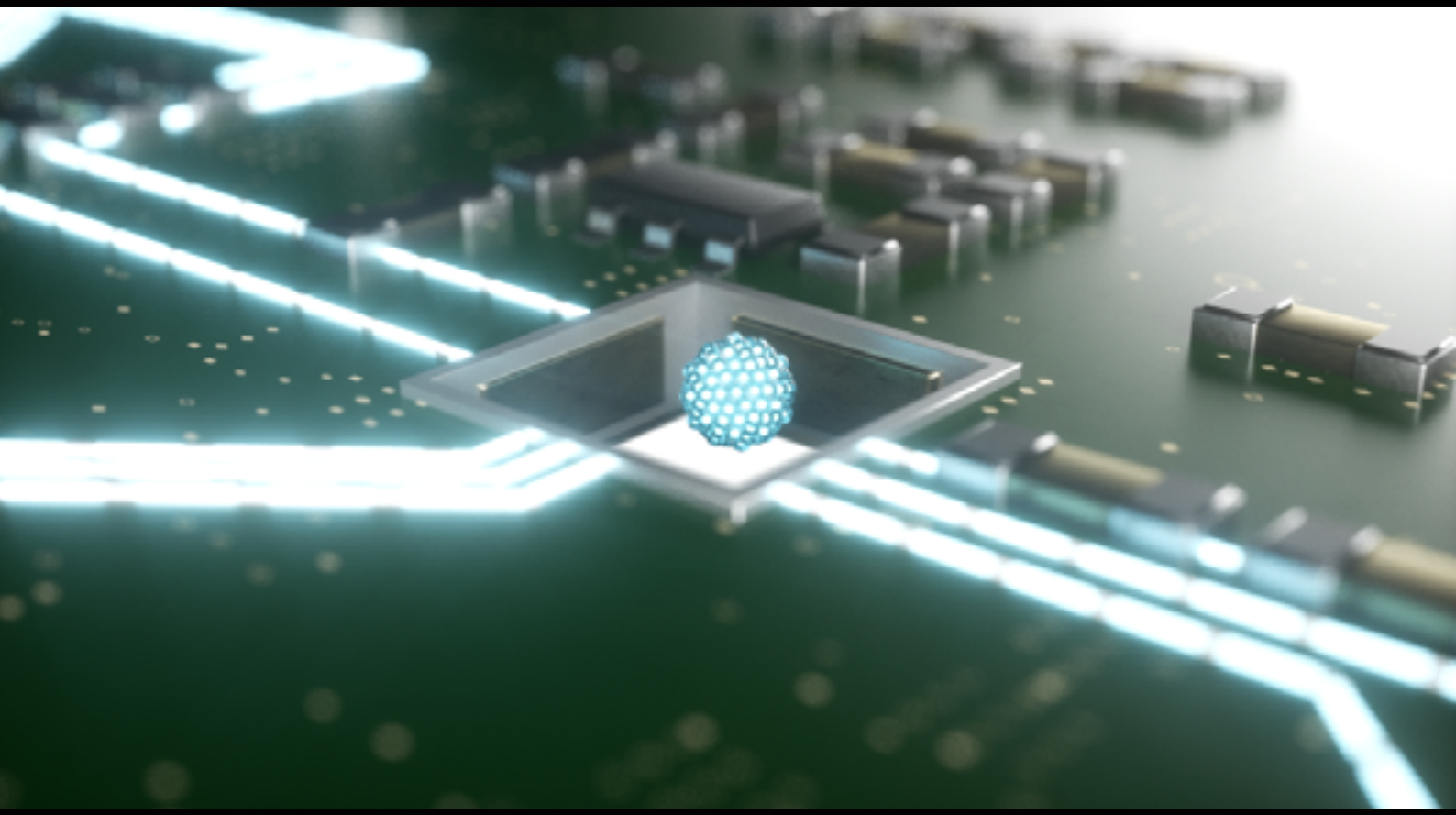


Image credit - Mark Mazaitis for Dr James Millen

NANOTECHNOLOGY | PHOTONICS | BIOPHYSICS

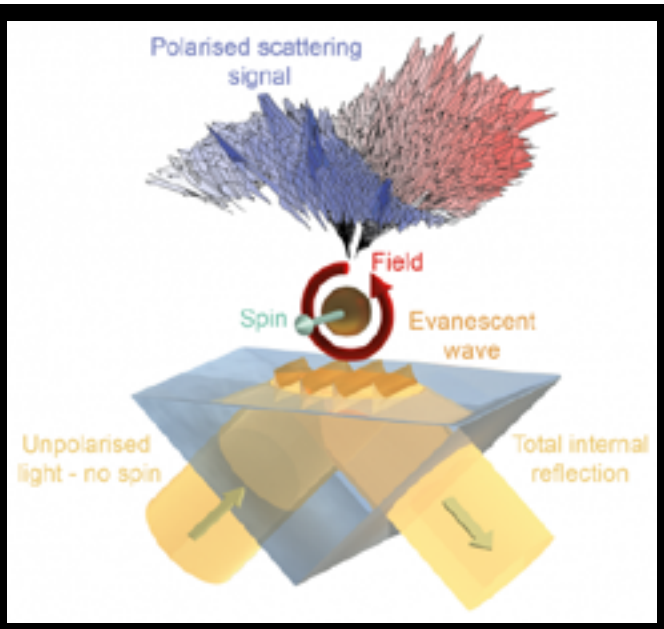
WELCOME TO NANOSTRAND

THE ANNUAL REVIEW FOR THE PHOTONICS & NANOTECHNOLOGY GROUP AND THE BIOLOGICAL PHYSICS & SOFT MATTER GROUP AT KING'S COLLEGE LONDON.

An update from Heads of Group
Professor Sergi Garcia Manyes &
Professor Anatoly Zayats

This has been yet another challenging year. As we gradually emerge from the pandemic, both theoretical and experimental activities have resumed at a high standard. We are very grateful to our students and postdocs for the impressive resilience and patience they have shown during crucial times for their professional development. Similarly, our professional and technical services have been immensely helpful at supporting our groups and our activity in general. With the unfaltering help of Faculty, we are now excited to look forward into the future. Many plans for expansion in both P&N and BPSM groups are underway, with planned recruitment at the academic level and with concomitant laboratory expansion. We are thrilled about the grant successes that we have managed to secure even during these difficult times, which will propel us forward in this exciting, imminent future ahead.

THE HUMBLE LIGHT BULB PROVES A SOURCE OF TRANSVERSE SPIN



Optical transforms like tight focussing and total internal reflection, which gives rise to an evanescent field, can lead to out-of-plane polarization components and transverse spin, even for totally unpolarized input light. (Courtesy: Konstantin Bliokh/Diane Roth)

Almost a hundred years on from its first proposal, a number of questions remain around what spin is. While understood to be a basic property characterizing and distinguishing fundamental particles just as charge or mass do, it is still not clear what exactly spin describes. Photon spin has been understood as a feature of circularly polarized light, and there remains a generally accepted association between spin and polarization – no polarization, no spin so the general understanding goes. Now P&N researchers in collaboration with scientists in Germany, Japan, France and the US, have demonstrated that even this basic assumption is no longer valid.

Notions of spin have already had a reset over the past ten years along with a broadening in the possible descriptions of the polarization of light. For laser beams or light at any significant distance from its source, light rays can be considered to travel parallel to each other (paraxial rays), in which case the polarization is always confined to the plane orthogonal to the direction of propagation. With light circularly polarized in this plane, the spin will consequently always be aligned either along the direction of propagation or directly opposite to it. However, subject the beam to total internal reflection, as for example in waveguides or just a prism, and a non-propagating evanescent field results, where it turns out the polarization has components in all three dimensions. Tightly focused beams can also result in 3-dimensional polarization. For 3D polarization states, spin transverse to the direction of propagation is possible, as researchers at King's shown several years ago.

"We saw some interesting phenomena in electromagnetism that were hard to explain," says Francisco Rodríguez Fortuño, a P&N researcher, recalling the first time they realised 3D polarization could give rise to transverse spin. "Then everything made sense." Soon observations of transverse spin following transformations akin to reflection or focussing were flooding in for light in various experiments. However, according to theory even totally unpolarized light can lead to transverse spin. The reasoning follows from the expansion from 2D the polarization states to describe a paraxial beam and the 3D polarization states used once it has been transformed into an evanescent field by total internal reflection. Even a beam totally unpolarized in 2D would have some order of polarization when the polarization is described in 3D due to the lack of longitudinal components of the spin. The next challenge was to observe transverse spin experimentally from a totally unpolarized beam.

Diane Roth was one of the P&N researchers demonstrating this in the experiments with evanescent fields. As Roth points out, one of the obstacles to experimental validation of this theory was the difficulty in sourcing completely unpolarized light bright enough for the effect to be measured, since lasers and the usual lab light sources are all polarized in one or another degree. In the end they used a humble light bulb and sure enough they observed signatures of transverse spin. With collaborators in Germany working with tight focussing and a different source of unpolarized light were also able to corroborate the theory. The results suggest that transverse spin may be present in instances as common as totally internally reflected sunlight. Meanwhile a valid definition of what is meant by that spin remains ever more elusive.

PHD OPPORTUNITIES

The Biological Physics Across Scales (BiPAS) CDT focus is to understand how complex macroscopic phenomena—observed at scales appropriate to tissue, organism, or even population—arise from mechanisms at the cellular, molecular, and atomic level.

The Leverhulme Doctoral Scholarship Programme 'Mechanics of Life' aims to train future research leaders to develop new techniques, methodologies and analytical tools required to resolve outstanding challenges underpinning Mechanobiology across a broad range of biological themes.

In 2022, the P&N group invites enthusiastic and highly qualified candidates to work on the projects related to studies of light-matter interactions on the nanoscale, ultrafast optics, optomechanics, nanoparticles and in particular:

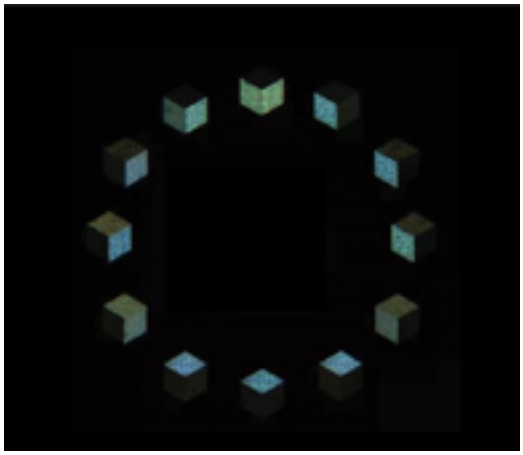
Caustics and Catastrophes in Strong-Field and Attosecond Processes
Levitation to Understand Physics at the Nanoscale
Spatial and Temporal Structures in Attosecond Light
Ultrafast Complex Laser Field Synthesis

P&N RESEARCHERS HOST THE 7TH LONDON PLASMONICS FORUM

The 7th Annual London Plasmonics Forum was held online on 9 June 2021. Hosted by Professor Anatoly Zayats, PI of the EPSRC Programme Grant Reactive Plasmonics, the event was held online for the 2nd year in a row due to restrictions still being in place for large events. It showcased the plasmonics research carried out during the past six years on the programme grant, including the discovery of new materials for hot electron applications, plasmonics chemistry and photocatalysis and the use of hot electron in optoelectronics.

In the afternoon, the Plasmonics Forum welcomed two external speakers. Ruben Haman from Vrije Universiteit Amsterdam gave a talk entitled 'Super-resolution mapping of a chemical reaction driven by plasmonic near-fields' and Dr Wouter Koopman from Universität Potsdam spoke about 'The importance of heat in plasmon driven coupling reactions.'

After the talks, Plasmonics researchers participated in a round table discussion about the future of the field, with new ideas for nanostructures and materials. As the Plasmonics Forum poster session was online, entries to the poster session came from far and wide. Dr Nina Meinzer from Nature Physics,



Dr Rachel Won from Nature Photonics and Dr Anna Demming from New Scientist formed the judging committee, with two winners being picked. When judging the posters, the committee considered the science presented, the poster's design, and the flash poster presentation.

Congratulations to the winners Dr Ming Fu from Imperial College London 'Directional Enhanced Raman Scattering Coupled into Plasmonic Waveguide with Near-Unity Couple Efficiency' and Dr Joanna Symonowicz from the University of Cambridge for 'Real-Time In-Situ Optical Tracking of Memrisitive Switching.'

Funding Success

A selection of recent grant announcements:

Nanomechanical intervention of bacterial mechanotransduction
Sergi Garcia-Manyes

Unlocking thermodynamically-forbidden chemical reactivity with mechanical force
Sergi Garcia-Manyes

Self-assembled protein-based biomaterials
Chris Lorenz

L-MEMS: Development of a Levitated Micro Electro Mechanical Sensor
James Millen

New Frontiers of Strong-Field Physics: Vortices, Catastrophes, and Quantum Electrodynamics
Emilio Pisanty

Next-Generation Bioinspired Theranostic Probes Based on Conjugated Polymer Nanoparticles
Aliaksandra Rakovich

AOMS: Attosecond Optoelectronic with Meta-Solids
Amelle Zaïr

XAWO: XUV Attosecond source Wavefront Optimization
Amelle Zaïr

P&N WELCOMES ROYAL SOCIETY UNIVERSITY RESEARCH FELLOW

Dr Emilio Pisanty has joined the P&N Group as a Royal Society University Research Fellow. The scheme is for outstanding scientists who are in the early stages of their research career and have the potential to become leaders in their field. These long term fellowships provide the opportunity and freedom to build an independent research career in the UK or Republic of Ireland and pursue cutting-edge scientific research. Dr Pisanty joins King's from the Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin. He will be researching 'New Frontiers of Strong-Field Physics: Vortices, Catastrophes, and Quantum Electrodynamics.'

TAKING MAXWELL'S EQUATIONS FOR A SPIN

John Clerk Maxwell developed his famous Maxwell Equations whilst working at King's College London in the late 19th Century. The Maxwell Equations are four equations which link the fundamental behaviour of electric and magnetic fields.

Electromagnetic fields and waves, including light, are essential in modern technologies providing internet, mobile phones, lasers. In the quest for ever smaller and energy-efficient devices, researchers study the interaction of electromagnetic waves with nanostructures.

As the spaces being studied are so small, often smaller than the wavelength of light or 'sub-wavelength', several new parameters of light waves become crucial, such as light polarisation, which define the spin of light.

> *Using this approach, it is very easy to see new, unexpected phenomena in the electromagnetic spin behaviour. For example, we predicted and experimentally observed dynamic behaviour of the transverse spin of guided waves arising due to spin-orbit coupling, which has completely different behaviour from the static transverse spin of evanescent plane waves.*
>
> *Professor Anatoly Zayats*

Following in Maxwell's footsteps, a team of LCN researchers at the Physics Department, King's College London, in collaboration with Shenzhen University in China, have developed the set of equations for spin and momentum of the electromagnetic field, which are analogous to the Maxwell's equations. This new set of equations allow a direct understanding of spin properties without the explicit knowledge of the electromagnetic field.

In analogy to renown effects in condensed matter physics, photonic quantum spin-Hall effect and photonic skyrmions require careful description of spin properties of light waves, which is possible with Maxwell's equations, but the derivations are lengthy and cumbersome.
Using the newly developed equations, the team has now demonstrated the unconventional spin properties of the electromagnetic waves carrying orbital angular momentum, important for optical communications, quantum technologies, high-resolution imaging and many other fields.

The new equations offer a short cut for describing the unconventional spin behaviour of the electromagnetic waves, and can be applied to describe also fluid, acoustic and gravitational waves.
Transverse spin dynamics in structured electromagnetic guided waves is published in Proceedings of the National Academy of Sciences of the United States of America.

SEMINAR SERIES

for more information email physics-research@kcl.ac.uk

The P&N and BPSM group seminar series that are open to the research community.

Force Talks - A seminar from world leaders in mechanobiology hosted by Leverhulme Mechanics of Life DSP

Light and Matter Seminar Series - Hosted by the P&N Group

London Centre for Nanotechnology - Joint seminars on a chosen topic from LCN PIs from King's, UCL and Imperial

Seminars in Biophysics - Joint hosted by BPSM, BIPAS CDT and the Centre for the Physical Science of Life

Thomas Young Centre - Events and seminar on the theory and simulation of materials.

PROFESSOR ANATOLY ZAYATS AWARDED PRESTIGIOUS HUMBOLDT RESEARCH AWARD

THE HUMBOLDT RESEARCH AWARD RECOGNISES ACADEMIC EXCELLENCE

Head of P&N, Professor Anatoly Zayats has been awarded the Humboldt Research Award. Every year, the Alexander von Humboldt Foundation grants Humboldt Research Awards to internationally renowned academics from abroad in recognition of their entire academic record to date.

His current research interests are in the field of nanophotonics, which focuses on how light interacts with nanoscale objects – either nanoparticles or more complex man-made nanostructures. Anatoly's research investigates how the nanostructuring of materials affects their optical properties (such as changing gold to appear as green, orange, red or invisible). In combining nanostructures together, artificial materials (called metamaterials) can be created with properties which are not seen or difficult to achieve in natural materials. These effects are important not only for decorative and anti-counterfeiting applications, but also in the development of sensors capable of detecting explosives and various dangerous gasses, catalysing chemical reactions with light and new approaches for high-resolution optical imaging and optical information processing.

Commenting on the award, Anatoly said: It is a great honour to receive the Humboldt Research Prize. This prestigious award is the recognition for all the hard work of all my post-docs and PhD students who contributed to our progress in this field over the years. Nanophotonics and metamaterials is an exciting area of research with many practical applications and we will continue doing our best to uncover new useful properties of light.

MECHANICS OF LIFE LEVERHULME DOCTORAL SCHOLARSHIP PROGRAMME LAUNCHED

With the aim of training future research leaders to tackle key questions in biology from a distinctly mechanical perspective, the Leverhulme Trust-funded programme consolidates King's interdisciplinary research strengths across the Faculty of Natural, Mathematical & Engineering Sciences, Faculty of Life Sciences & Medicine, and Faculty of Dentistry, Oral & Craniofacial Sciences.

Research carried out by doctoral students will be enhanced by the establishment of a wider international partnership between King's, the Mechanobiology Institute (MBI) at the National University of Singapore, and the Physics of Living Systems Graduate Research Network (PoLS GRN) of the US National Science Foundation (NSF).

The programme was celebrated at a launch event, bringing together investigators and students from across King's.The event was opened by Professor David Richards, Vice Dean of Research, Faculty of Natural, Mathematical & Engineering Sciences, who spoke about the importance of interdisciplinary research at King's and how the programme builds on the rich history Maurice Wilkins and Rosalind Franklin.

Professor Sergi Garcia-Manyes, Director of the programme, spoke about the fundamentals of mechanobiology and how the programme will train researchers to work confidently and seamlessly across the Physical Sciences-Biology interface to revolutionise the life sciences with breakthrough understanding, disruptive technologies and ambitious innovation.

Owen Harrison and Ludovica Guetta, students from the first cohort of the programme, spoke on why they chose to pursue mechanobiology and their hopes for their projects.

Professor Malcolm Irving closed proceedings by presenting a fascinating talk on the mechanobiology of muscles.

Professor Sergi Garcia-Manyes at the launch of the DSP

We are delighted to have been awarded this Doctoral Scholarship Training programme by the Leverhulme Trust. This new Doctoral Training Programme on mechanobiology will capitalise on a research field where King's glows, and will provide the students with a unique, modern and interdisciplinary training provided by internationally leading supervisors at King's.

Professor Sergi Garcia-Manyes

15 YEARS OF THE YEARS OF THE THOMAS YOUNG CENTRE

November 2020 marked the 15th anniversary of the Thomas Young Centre (TYC), the London Centre for the Theory and Simulation of Materials. TYC is an interdisciplinary alliance of more than 100 research groups based at King's, Imperial, UCL and QMUL, working to address the challenges of society and industry through the theory and simulation of materials and molecular systems. Together with Imperial and UCL, King's was one of the founding members thanks to the enthusiasm of our late colleague, Professor Alessandro De Vita.

The TYC runs a varied and high-quality programme of events and training that brings people together on a regular basis across institutions, including highlight seminars, topical mini-symposia, international workshops, events for students as well as a materials modelling course for graduate students from September to March each year. It is named after Thomas Young (1773-1829), a London-based polymath who contributed to many different scientific fields, including light, vision, solid mechanics, energy, physiology and the deciphering of the Rosetta stone.

Professor Carla Molteni, Professor of Physics and TYC co-director at King's, says: "The TYC has been very important to give national and international visibility to research at King's on materials and molecular modelling, across different departments and faculties, and to promote connections and collaborations across the capital and beyond, making London a global centre in materials and molecular simulations and creating an inclusive community. Computational modelling will play an increasingly important role in the development of smart materials for advanced technologies and sustainability as well as in the understanding of complex biological processes. I wish to thank all the people that in different roles, in the past, present and future, have made and will made the TYC a successful enterprise."

The TYC has five interest groups focused on structural materials, functional materials and devices, surfaces and interfaces, soft and biological matter, and methods and formalisms for simulating materials. Research expertise within TYC spans length- and time-scales of processes and phenomena from the quantum mechanics of interacting electrons to macroscopic models of engineering components.

Dr George Booth, Reader in Theoretical Physics and leader of the interest group on Methods, says "Over the last 15 years, the TYC has served to bolster the reputation of computational materials and molecular modelling in London, drawing in people, collaborations, training and research facilities, and ensuring it is a world-renowned and national focal point for this key research area. I look forward to see it continue to thrive for the next 15 years with King's a central pillar in its success."

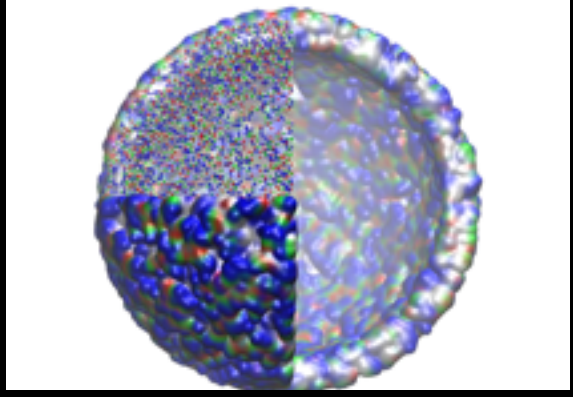
BPSM ACADEMIC RECEIVE NATIONAL PHYSICS LABORATORY'S MOST PRESTIGIOUS AWARD

Professor Chris Lorenz from BPSM group, is part of a team who won the annual Rayleigh Award for their paper Engineering chirally blind protein pseudocapsids into antibacterial persisters published in ACS Nano.

The paper contains promising evidence for developing a synthetic antibiotic, specifically designed to fight resistant bacterial infections, and was the result of collaboration between King's, the National Physical Laboratory, the University of Cambridge, University of Exeter and UCL.

This interdisciplinary work introduces a novel pre-clinical therapeutic paradigm for tackling antimicrobial resistance (AMR) by applying geometric principles to the design of artificial capsids or virus-like particles with specific biological functions. The experimental design is supported by state-of-the-art molecular dynamics to extract new design principles for antimicrobial agents with predictable properties.

The King's team carried out simulations of the nanoparticles of antimicrobial peptides, which provided: (a) a detailed description of the molecular scale interactions which are key to the formation and stabilisation of the antimicrobial peptide nanoparticles, (b) an understanding of the general structure of the peptides within the nanoparticles and (c) a detailed description of the mechanism of action of the resulting nanoparticles when interacting with model bacterial membranes - all of which provide a perfect complement to the experimental work done in the groups at NPL, University of Cambridge, University of Exeter and UCL.



Structure of the peptide nanoparticles - this figure demonstrates the distribution of peptides within the shell of the nanoparticle and

'I am very happy that this paper has been recognised by NPL as I think that it is a nice demonstration of the level of understanding that can be gained from an interdisciplinary study that provides insight from across various scales (in this case from molecular to cellular). The computational modelling performed at King's for this study is a perfect example of how these tools can be used to assist in the design and to provide the molecular-scale understanding of the structure and function of therapeutic nanoparticles which is currently unobtainable from experiment.'

Professor Chris Lorenz

WHEATSTONE LECTURE 2020 DELIVERED BY SIR PETER KNIGHT

THE ANNUAL WHEATSTONE LECTURE HOSTED BY THE DEPARTMENT OF PHYSICS.

The lecture was delivered by Professor Sir Peter Knight, Senior Research Investigator and Emeritus Professor at Imperial College London. His talk was entitled 'What's Quantum Technology?'

Due to COVID-19 restrictions the event was held online for the first time, and the Department was delighted to have 450 participants.

Sir Peter is often described as one of the UK's most influential scientists and leaders of scientific policy. In the lecture, he explored plans to develop the next generation of quantum technologies He explained that this includes commitments of over one billion pounds devoted to ensuring that advanced quantum science and demonstrator platforms in imaging, sensing, communications and computing will drive the formation of the Quantum Technology sector and embed this technology in a broad range of industries.

Unfortunately, due to the uncertainty surrounding events in early 2022, the Wheatstone Lecture has been postponed until 2023.

Sir Peter Knight delivering the online Wheatstone Lecture

P&N RESEARCHER AWARDED AN 'ITALY MADE ME' PRIZE

P&N Researcher Dr Michela Florinda Picardi has been awarded an 'Italy Made Me' prize. They are awarded to Italian early-career researchers, who received part of their education in Italy and work in the UK in the ERC domains of Life Sciences, Physical Sciences & Engineering, and Social Sciences & Humanities. The awardees are selected by the Italian Embassy scientific council on the basis of research excellence.

Michela was awarded her Italy Made Me 2020 prize at the Italian embassy in London for her innovative research related to the polarisation and angular momentum of light at the nanoscale.

Michela is inspired to work in this field for two main reasons. The first is the beauty of surprising and unexpected phenomena. She finds it striking because of the simple elements involved: shining a light on a tiny object and witnessing counterintuitive effects take place. The second reason is that the field is very applied, and it has almost immediate connections to feasible technological implementations. She feels that she is shaping the future of technology with her research, from medical applications to novel computers, monitors, cars to spaceships!

Prof. Carla Molteni, AISUK president and member of the Italian embassy scientific council, said; "Italy Made Me awards are an important recognition for the role of outstanding early career researchers in advancing scientific progress in a variety of disciplines and fields; they also recognise the importance of international mobility for research excellence. The quality of the applications was very high, which made the selection difficult and further highlights the merit and future potential of the awardees.'

I am extremely proud of this award. It recognises, at the same time, the excellence of the formation I had the privilege to get in my home country and the amazing research we do at King's. Initiatives like this make me realise how important it is to be able to identify the places in the world where our potential can best be expressed while never forgetting our roots and how our origins shape and define us.

Dr Michela Florinda Picardi

CELEBRATING THE INTERNATIONAL DAY OF LIGHT

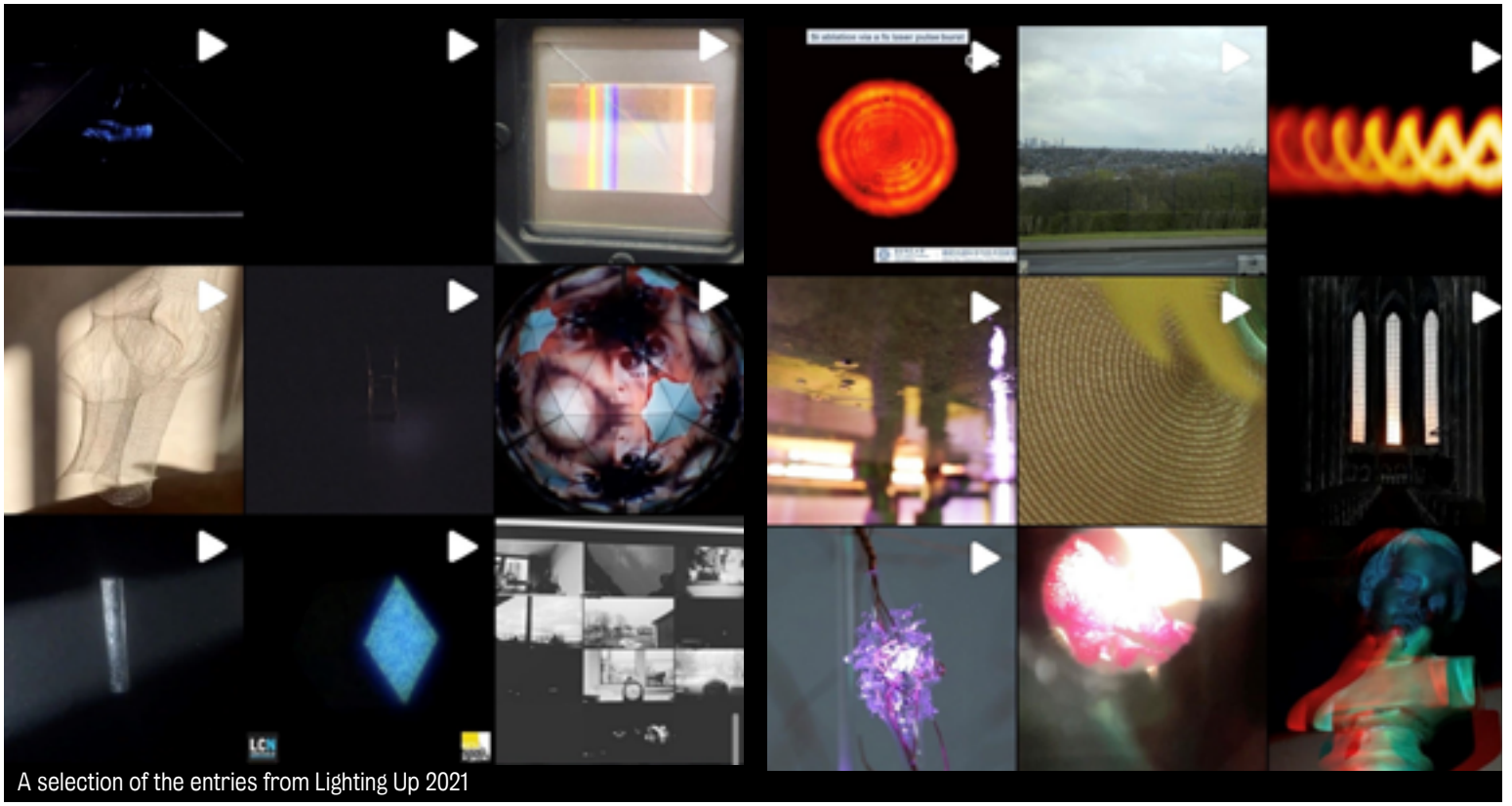
THE LONDON INSTITUTE FOR ADVANCED LIGHT TECHNOLOGIES HOSTED ONLINE EVENTS TO LIGHT UP 2021

In May 2020 the London Institute for Advanced Light Technologies hosted The Shared Language of Light, an interdisciplinary panel event to celebrate light in all its forms. The event was the culmination of Lighting Up 2021, a series of events that London Light hosted to celebrate the UNESCO International Day of Light.

Lighting Up 2021 included an art project with light enthusiasts from around the globe, and the chance for people to share short videos about an element of light which delighted them (the submissions can be viewed on the London Light Instagram page) The Shared Language of Light was hosted by artist and curator Dr Shelley James and after a short introduction from LCN & London Light co-director Anatoly Zayats, the panellists discussed the Lighting Up submissions and why they found them inspiring.

The panellists were LCN physicist Dr James Millen, architect Mark Major, art publisher Kailas Elmer, colour specialist Marianne Shillingford and astronomer Bob Mizon OBE.

Of the event, Professor Anatoly Zayats said 'This was a fantastic event which captured all the essence of the International Day of Light and touched upon many aspects from the science of light to simply how light brightens our lives. It is light that made the event possible this year, both figuratively and literally, by connecting our computers through the internet. The discussions and presentations vividly demonstrated the role of light at very small scales, acting as a tool in nanotechnology, and at large scales helping us to study the Universe, the problems of light pollution, and our perception of colours and lighting. Our day-to-day job at the London Institute for Advanced Light Technologies is to study light, but it is important and extremely informative to have a broader conversation on the subject and engage with artists and society. We are proud to host this event and facilitate this fantastic interdisciplinary collaboration.'



A selection of the entries from Lighting Up 2021

A SELECTION OF OUR RECENT PUBLICATIONS

Eismann, J.S, Nicholls, L.H, Roth, D.J, Alonso, M.A, Banzer, P, Rodríguez-Fortuño, F.J, Zayats, A.V, Nori, F. and Bliokh, K.Y. (2021)
Transverse spinning of unpolarized light.
Nature Photonics https://doi.org/10.1038/s41566-020-00733-3

Lei, X, Yang, A, Shi, P, Xie, Z, Du, L, Zayats, A.V. and Yuan, X (2021)
Photonic spin lattices: symmetry constraints for skyrmion and meron topologies.
Physical Review Letters https://doi.org/10.1103/PhysRevLett.127.237403

Li, G.C, Lei, D, Qiu, M, Jin, W, Lan, S, & Zayats, A.V (2021)
Light-induced symmetry breaking for enhancing second-harmonic generation from an ultrathin plasmonic nanocavity.
Nature Communications https://doi.org/10.1038/s41467-021-24408-x

Shi, P. Du, L, Li, C, Zayats, A.V and Yuan, X (2021)
Transverse spin dynamics in structured electromagnetic guided waves.
Proceedings of the National Academy of Sciences of the USA https://doi.org/10.1073/pnas.2018816118

Chen, P.G, Li, Z, Qi, Y, Lo, T.W, Wang, S, Jin, W, Wong, K.Y, Fan, S, Zayats, A.V and Lei, D (2021)
Long-range directional routing and spatial selection of high spin-purity valley trion emission in a WS2 monolayer.
ACS Nano https://doi.org/10.1021/acsnano.1c06955

Zhao, M, Leggett, E, Bourke, S, Poursanidou, S, Carter-Searjeant, S, Po, S, Palma do Carmo, M, Dailey, L.A, Manning, P, Ryan, S.G, Urbano, L, Green, M.A and Rakovich, A (2021)
Theranostic near-infrared-active conjugated polymer nanoparticles.
ACS Nano https://doi.org/10.1021/acsnano.1c01257

Bykov, A.Y, Shukla, A, van Schilfgaarde, M, Green, M.A and Zayats, A.V (2021)
Ultrafast carrier and lattice dynamics in plasmonic nanocrystalline copper sulfide films.
Laser and Photonics Reviews https://doi.org/10.1002/lpor.202000346

Orthodoxou, C, Zaïr, A and Booth, G.H (2021)
High harmonic generation in two-dimensional mott insulators.
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Bykov, A.Y, Roth, D.J, Sartorello, G, Salmón-Gamboa, J.U and Zayats, A.V (2021)
Dynamics of hot carriers in plasmonic heterostructures.
Nanophotonics https://doi.org/10.1515/nanoph-2021-0278

Wallis, S.S, Ventimiglia, L.N, Otigbah, E, Infante, E, Cuesta-Geijo, M.A, Kidiyoor, G.R, Carbajal, M.A, Fleck, R.A, Foiani, M, Garcia-Manyes, SMartin-Serrano, J and Agromayor, M (2021)
The ESCRT machinery counteracts Nesprin-2G-mediated mechanical forces during nuclear envelope repair.
Developmental Cell https://doi.org/10.1016/j.devcel.2021.10.022

Andreu, I, Falcones, B, Hurst, S, Chahare, N, Quiroga, X, Le Roux, A.L, Kechagia, Z, Beedle, A.E, Elosegui-Artola, A, Trepat, X, Farré, R, Betz, T, Almendros , I and Roca-Cusachs (2021)
The force loading rate drives cell mechanosensing through both reinforcement and cytoskeletal softening.
Nature Communications https://doi.org/10.1038/s41467-021-24383-3

Sanderson, L ,da Silva, M , Sekhar, G.N ,Brown, R.C ,Burrell-Saward, H ,Fidanboylu, M ,Liu, N ,Dailey, L ,Dreiss, C.A, Lorenz, C, Christie, M ,Persaud, S.J ,Yardley, V ,Croft, S.L ,Valero, M ,Thomas, S. A (2021)
Drug reformulation for a neglected disease. The NANOHAT project to develop a safer more effective sleeping sickness drug.
PLOS Neglected Tropical Diseases https://doi.org/10.1371/journal.pntd.0009276

Stannard, A, Mora, M, Beedle, A.E, Castro-López, M, Board, S. and Garcia-Manyes, S (2021)
Molecular fluctuations as a ruler of force-induced protein conformations.
Nano Letters https://doi.org/10.1021/acs.nanolett.1c00051

Teijeiro-Gonzalez, Y, Crnjar, A, Beavil, A.J, Beavil, R.L, Nedbal, J, Le Marois, A, Molteni, C. and Suhling, K (2021)
Time-resolved fluorescence anisotropy and molecular dynamics analysis of a novel gfp homo-fret dimer.
Biophysical Journal https://doi.org/10.1016/j.bpj.2020.11.2275

Yadegari, H., Koronfel, M.A, Wang, K, Thornton, D, Stephens, I.E, Molteni, C. Haynes, P.D and Ryan, M.P (2021)
Operando measurement of layer breathing modes in lithiated graphite.
ACS Energy Letters https://doi.org/10.1021/acsenergylett.1c00494

Gachon, E. and Mesquida, P (2021)
Mechanical strain alters the surface charge of collagen fibrils.
ACS Nano https://doi.org/10.1021/acsnano.1c00682