

May 2021

Head of School Summary

As we come to the end of another challenging semester I am pleased that slowly we are opening up the School again, keeping always in mind the need to remain COVID-19 safe. Many thanks to my colleagues who were able to provide some in-person teaching in our Undergraduate Laboratory in GO Jones as well as running some in-person classes in other modules using central facilities. We have completed the delayed purchase of further items of experimental apparatus to enhance our teaching laboratory and look forward greatly to seeing it in full use again. Last month we held a “Town Hall” meeting, arranged by Harvey Abraham-Green with our undergraduate students. It was attended by myself, the Director of Education and our new School Manager. A wide range of questions from the student body were addressed as part of our desire to improve communication and transparency.

As we readjust to a cautious return to in-person mixing it is of course apparent just how exhausting and stressful it has been for all our staff and students during 2021 and we have instigated a “breathing week”, to coincide with Mental Health Awareness Week 2021, where no School meetings will be held. Going forward we will be doing our best not to schedule meetings on Fridays to ensure that as far as possible colleagues get a day of work uninterrupted by scheduled meetings.

A major achievement and the culmination of many months of hard work by so many, has been the submission of our School’s “Environment Statement” as part of the University submission for the Research Excellence Framework REF 2021. Many colleagues contributed directly to writing this, and everyone in the School has in terms of their contributions to research and its impact since the 2014 REF, but I’d like to especially thank Prof Gabriele Travaglini and Kati Schwab for their tireless efforts and supreme attention to detail. We await the outcome which will be published in April 2022.

Now that the vaccination roll-out is progressing well we are seeing more colleagues making visits to the School and it has been a great pleasure to see them (from a safe distance) in person.

My best wishes to all of you, Prof Peter Hobson

WELCOME

[Dr Prabhjot Singh](#), has joined (Particle Physics Research Centre) PPRC, neutrino group. Dr Singh did his PhD at Delhi University, and for 3.5 years he was based at Fermilab to closely work with the NOvA experiment. He was a postdoc at Delhi University for one year working on non standard interactions (NSI) in NOvA before joining us in January 2021. Dr Singh now works alongside Dr Linda Cremonesi on better understanding neutrino interactions in neutrino oscillations measurements with the NOvA and DUNE experiments.

[Dr Jia-Chen Hua](#), has joined (Particle Physics Research Centre) PPRC to work on the SAPIENS project led by Dr Marcella Bona (School Of Physics and Astronomy) and Prof John Moriarty (School of Mathematical Sciences). Dr Hua has a uniquely blended background in statistical physics of quantitative finance, nonlinear physics of fluid dynamics, spatio-temporal learning and high-dimensional time series analysis, data-driven modeling of complex systems dynamics, statistical modeling and calibrating of stochastic processes, machine learning, and sparse identification of nonlinear systems. He completed his PhD in Physics at University of Houston, USA and he worked as a Postdoctoral Researcher in Machine Learning at Oxford University after working as a postdoc in University of Houston, University of Sydney, University of Luxembourg, and Norwegian University of Science and Technology. Dr Hua will be developing a proof-of-concept air quality prediction system that will provide hyper-local, dynamic pollution forecasts for Mexico City using existing open data sources. In particular, openly available traffic intensity data will be used to mitigate the lower density of air sensors in Mexico City.

[Dr Sherif Ibrahim](#), is working on a EPSRC New Horizons grant with Prof William Gillin. Dr Ibrahim is working on building a new type of Single Photon Emitter (SPE) which can be easily integrated onto Photonic Integrated Circuits. These SPEs are a key part of photonic Quantum Computation and Quantum Key Distribution.

[Dr Nick Underwood](#) and [Dr Alifah Rahman](#) who joined us as newly appointed Teaching Fellows during Semester B. Dr Rahman completed her thesis Ferromagnetic MnSb Growth on Graphene and joined the teaching teams for Physics Laboratory and Introduction to Scientific Computing. Dr Underwood has a background in quantum and statistical physics and extensive teaching experience in the UK and USA. He has been teaching Mathematical Techniques 2 as the module organiser and supported on Electric and Magnetic Fields as the module associate.

[Lorna Ireland](#), The School welcomes our new School Manager. Lorna, who joined us earlier this year, has previously worked in various roles across the University including Council Secretariat, the School of Business and Management, the Blizzard Institute and the Institute of Dentistry. As School Manager, Lorna has overall responsibility for managing the Professional and Technical services teams within the School and associated administrative functions including Health and Safety, Financial and Human Resource management, planning and development, Research, student services, public engagement, and external partnerships. She works closely with the Head of School and is a member of the Senior Executive Team with an operational role in development and implement of School strategy. Lorna is a trained workplace Mediator, Mental Health First aider and PRINCE2 registered practitioner. We are extremely pleased to have such an experienced person joining us and her knowledge of Queen Mary, gained from a variety of previous roles and membership of other Faculties, is very valuable too. Welcome Lorna!

[Alex Williams](#), our Student Recruitment and Outreach Officer. Alex will be supporting recruitment activity and taking a leading role on our outreach offering

CONGRATULATIONS

To Dr Guanqun Cai, who has successfully defended his PhD thesis "*Studying orientational order with neutron total scattering*", impressing his examiners Dr Joe Hriljac (Birmingham) and Dr Theo Kreouzis (Centre for Condensed Matter and Materials Physics, CCMMP), and passing with minor corrections. His supervisors were Prof Martin Dove and Dr Anthony Phillips. Dr Cai has now returned to China to take up a postdoctoral research post.

To Ying Liu who passed her online viva in just 2.5 hours with minor corrections on 21st January 2021. The examiners noted that Ying spoke knowledgeably and confidently about her research field as she defended her thesis on the model-free analysis of the atomic structure in ultra-small quantum dots.

This a double celebration for Ying as she also secured a job as Research Associate in Machine Learning, funded by the University of Leicester and Tangi0 Ltd. We wish her all the success in the new job.

To Kymani Armstrong-Williams who has successfully won a S&E BAME PhD studentship, Armstrong-Williams will be supervised by Dr Chris White.

CONGRATULATIONS

Dr Seth Zenz for being awarded the SEPnet Public Engagement Champion Award in recognition of his commitment to developing his engagement expertise, his championing of engagement in the School and his support of other staff and students to develop their own engagement activities.

Dr Seth Zenz is currently working on developing a stream of our Physics Research in School Environments outreach programme as well as developing an activity focused on Higgs boson dominoes, funding by QMUL's Centre for Public Engagement and the STFC.

The Centre for Research in String Theory (CRST) have won two Marie Curie Individual Fellowships, "*Bootstrap and Uniqueness for Form Factors and the S-matrix*" (Principal investigator, Prof Andi Brandhuber), "*Chiral Algebras and Massless BPS Particles of 4d N=3 Superconformal theories*" (Principal Investigator, Dr Costis Papageorgakis).

Prof Alan Drew has recently been successful in receiving a British Council Researcher Links Climate Change Grant, with a title of "Delivering a battery revolution - reducing the drivers of climate change in Indonesia ". This grant is a pre-COP26 activity, aimed at promoting research collaborations between the UK and Indonesia in batteries, energy and climate change. A call for funding for up to five joint Indonesia/UK research projects will be issued in due course, where interdisciplinary teams or early career researchers (masters students, PhD students and researchers up to 5 years post PhD) will be able to bid for up to £10k each, to support original research projects in the climate change area. Related to this initiative, Prof Drew has been asked to be an international scientific advisor to the Indonesian Minister for Research & Technology and Indonesian Minister for Transport. Prof Drew has also been asked to be a National Research Priority Leader (distributing funding on behalf of the Indonesian government to local researchers to carry out research). He has recently been added to the BEIS Roster of Experts under their Skills-Share scheme (<https://www.ukpact.co.uk/skill-shares-and-secondments>) as a result of his work on energy and climate change in Indonesia, and has been elected the Hon. Secretary of the IOP Environmental Physics Group. Prof Drew has also been in negotiations with the British Embassy in Jakarta for a joint project with the embassy and Indonesian government on implementing their climate change commitments (COP21, Paris Agreement), and the project has just recently been approved to go ahead by the Ambassador. Alan will meet with BEIS and FCDO in London in a few weeks to finalise the project/funding submission (deadline in May).

Alumni in Career session

We had two alumni pop into the careers sessions for the Professional Skills for Scientists module for 1st year students: [Abraham Sedri](#) and [Ryan Hill](#) to explain to students how they use what they learnt in their degree and time at QMUL in their current roles.

International Womens' Day

Monday, 8th March was International Women's Day (IWD), the most significant and widely-recognised global event to promote gender equality across all aspects of society. Whilst we were unable to hold our usual SPA events in person this year, a number of activities held across QMUL celebrated the day.

Twitter: Stefanie Hurrell and Alex Williams ran a fantastic Twitter campaign profiling famous female physicists, QMUL alumnae, current School members and hearing from our undergraduates. You can still follow this at [@PhysicsatQM](https://twitter.com/PhysicsatQM).

WISE@QMUL: the local QMUL chapter of WISE (Women in Science and Engineering) is organising a free two-day virtual conference with an excellent line-up of QMUL science alumnae speaking. More details [here](#).

Further IWD Info: The official page of IWD2021 is [here](#), including details behind this year's theme of 'Choose to Challenge'. There's a huge searchable database of online [events](#), videos and resources.

BUSSTEPP (British University Summer School in Theoretical Elementary Particle Physics)

From 11 January to 5 February School of Physics and Astronomy hosted the 50th edition of the STFC-funded PhD school BUSSTEPP. Despite the disruption brought by covid (the school took place online) we had a very successful event with daily lectures, 174 registered participants, 13 lecturers and 15 postdoctoral tutors. The organising committee (Dr Matthew Buican, Dr Ricardo Monteiro, Dr Costis Papageorgakis, Dr Rodolfo Russo) was helped by Jonathan Anegbeh, Srividhya Kulandaivelu, and several of the CRST PhD students.

The materials from the school are available at [here](#)

Many thanks to everyone who made this event possible!

Equality Diversity and Inclusion (EDI) updates

Introducing Inclusion training

A new mandatory online training 'Introducing Inclusion' for all Queen Mary staff was launched on Wednesday, 20 January 2021, with a view to everyone having completed the programme by the end of April 2021.

To access the training, please click this [link](#). If prompted, click continue, log in to QM+, click the [link](#) again to navigate to the course. If for any reason you find that you are unable to log into QMplus, please raise a support ticket with IT. Introducing Inclusion has already been taken by staff across the University including the Senior Executive Team and received very positive feedback.

If you have any questions about the training, please contact Jill Scott, jill.scott@qmul.ac.uk.

New Translation of Newton's Principia

Our colleague in the School of Mathematical Sciences, Emeritus Prof Charles Leedham-Green, has just

published a monumental [new translation](#) of the third edition of Isaac Newton's, *The Mathematical Principles of Natural Philosophy*. Usually referred to as simply *The Principia*, Newton's book was first published (in Latin) in 1687 and is considered to be the foundation of mathematical physics. Leedham-Green was helped in his task by Prof Carl Murray from the School of Physics and Astronomy. Murray redrew all of Newton's diagrams for inclusion in the book and also worked on updating Newton's 17th century star maps showing observations of the Great Comet of 1680. The new translation is heavily annotated with copious notes explaining Newton's work and its context. Murray said, "This book is the result of almost twenty years of effort by Charles and it is an incredible achievement. I am delighted that I was able to help him in some small way." Leedham-Green has also produced a [blog](#) where he writes about various aspects of the translation. In [one of his latest posts](#) Leedham-Green discusses how Newton used calculus (which he co-discovered with Leibniz) in *The Principia* and draws attention to the pioneering translation of *The Principia* into French by [Emilie du Châtelet](#); her book was completed shortly before her death in 1749 and finally published seven years later.

Possible illustration:

https://en.wikipedia.org/wiki/Philosophiæ_Naturalis_Principia_Mathematica#/media/File:Principia-title.png

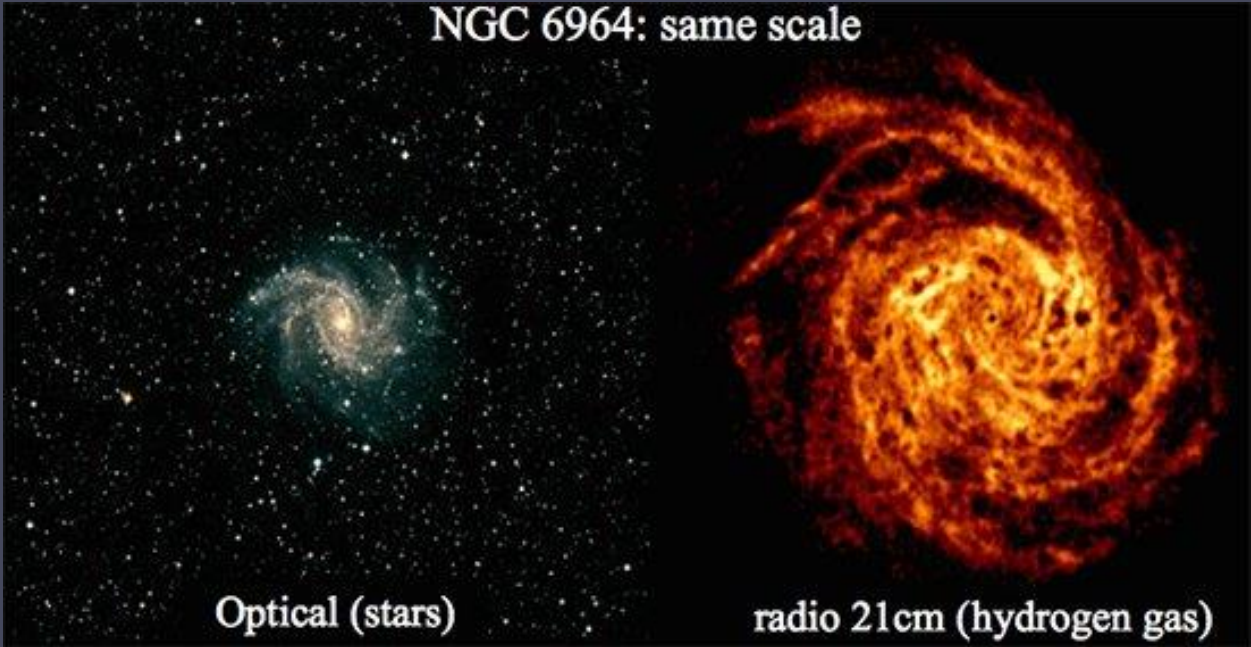
Fundamental Constants set limit on speed of sound, awarded Top 10 Physics breakthroughs in 2020

To Prof Kostya Trachenko of Queen Mary University of London, Dr Bartomeu Monserrat and Prof Chris Pickard of the University of Cambridge and Prof Vadim Brazhkin of the Russian Academy of Sciences for calculations showing that the upper limit on the speed of sound in solids and liquids depends on just two dimensionless quantities – the fine structure constant and the proton-to-electron mass ratio. The team's theoretical prediction is backed up by experimental data of the speed of sound in a range of solid materials and a calculation of the speed of sound in metallic hydrogen – a material that is yet to be created in the lab but should have the fastest speed of sound. The research provides insight into how fundamental constants impose bounds on physical properties. [Read more](#)

HI Galaxies with the Square Kilometer Array

On Monday 22nd February, we hosted an online mini-workshop on surveys of HI galaxies with the Square Kilometre Array. Most galaxies are HI galaxies, i.e. they contain large amounts of neutral hydrogen, which we can observe in the radio using the 21cm "spin-flip" emission line. Detecting and studying large numbers of these galaxies is one of the key science drivers of the SKA. This was the first jointly-organised workshop on this topic between the SKA Cosmology and HI Galaxy Science working groups, and attracted over 60 remote attendees for the 2 hour session.

NGC 6964: same scale



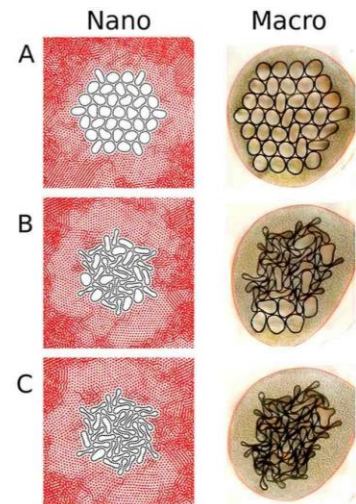
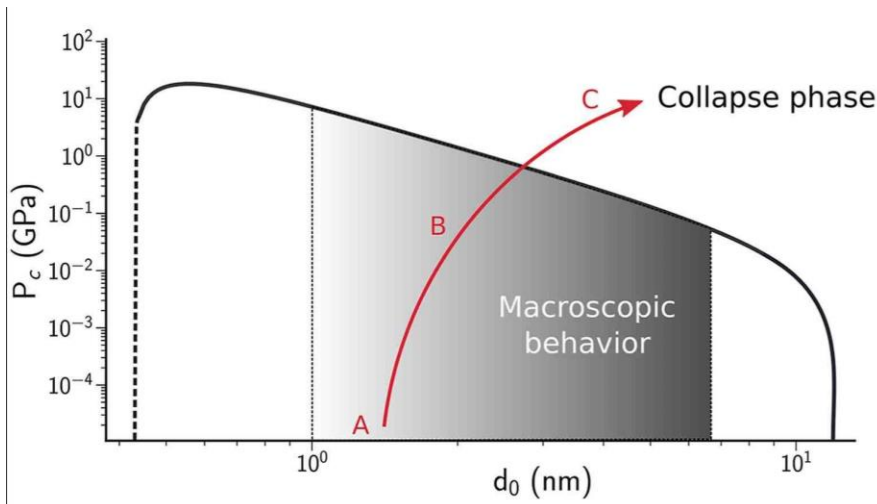
Optical (stars)

radio 21cm (hydrogen gas)



O-rings are a model for Carbon Nanotubes

Prof David Dunstan and coworkers in Lyons, MIT and China have managed to get photographs of O-rings into the journal *Carbon*. The upper images show carbon nanotubes under low pressure, and collapsing under high pressure in solid argon (in simulations). The lower pictures show O-rings similarly, in a two-dimensional pressure medium of small ball-bearings (in experiments done in Lyons and here). Take-home message: Carbon nanotubes are similar to macroscopic tubes."



Jobs

We are currently recruiting for a number of positions in the School. For more information please click [here](#).

If you have any news for the monthly School newsletter. Please contact Sri - s.kulandaivelu@gmul.ac.uk



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SPA Monthly newsletter

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