

This illustration, created at the Centres for Disease Control and Prevention (CDC), reveals ultrastructural morphology exhibited by coronaviruses using electron microscopy. The spikes adorning the outer surface of the virus resemble a 'corona', or crown, surrounding the virion.

Photo credit: CDC/ Alissa Eckert, MS; Dan Higgins, MAMS

You-Know-What

Yes, you know what we're talking about.

The current coronavirus outbreak is causing worldwide disruption and our day to day lives seem to resemble nothing of that several weeks ago. This is an unsettling time for all of us, so we have provided a few hints and tips on page 6.

All other content in this issue will be (mostly) coronavirus free, we promise!

Welcome to Lauren

We are very pleased to introduce you to the new PGI Administrator, Lauren Livingstone.

After completing her degree in Nutritional Therapy, Lauren spent some time travelling abroad, which led to working in both Australia and New Zealand in various administrative/project roles. This included a 2-year role at Auckland Council, where she primarily worked within the Auckland Plan Project Team. Lauren then returned to the UK and joined the United Kingdom Accreditation Service (UKAS) where she has worked for the last 7 years. Working at UKAS has led to an appreciation of the importance of metrology, and the impact it has on the world.

Lauren looks forward to getting to know you and supporting the PGI team and researchers.



Upcoming events

PGI induction
22 April, online

N.B. Due to Coronavirus and in line with current government advice, all PGI face-to-face training courses and events have been cancelled until further notice. The PGI is looking to provide alternative activities and resources in due course. Please see [page 7](#) and keep updated through our monthly bulletin.

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Director's message

By Richard Burguete

We are living in unusual times but I hope that this latest edition of GradPost will be a welcome distraction during a time when you might be away from your usual place of study, having to manage a completely new way of working, as well as being away from the lab and your colleagues. This edition of GradPost is filled with an array of stories providing wonderful examples of how you are having an impact in fields such as diverse as antibiotic resistance and the fundamentals of nuclear structure. There has also been a steady stream of awards and plaudits that show how highly regarded your work is and I encourage you to continue to put yourself forward so that your work can be recognised. The second edition of "A Year in the PGI" gives you a brief account of some of our key successes in 2019 to which all of you have contributed and shows how the PGI continues to go from strength to strength – we are now in our 5th year and hope to celebrate that anniversary when things return to normal.

Change can often provide unexpected opportunities and so the situation we're in now can free up time for training. The PGI training lead, Linden Fradet, has been working tirelessly to reconfigure the training plan so that materials are free to access and available online – please take advantage of this opportunity to develop your knowledge and understanding of measurement science as it could put you in a strong position when you return to normal working.

Finally I would also like to welcome Lauren Livingstone, our new PGI Administrator, who joined us in February and has yet to experience a normal day in the PGI! I hope that your days ahead are filled with interesting and meaningful experiences that will provide you some new perspectives, which you will find beneficial in future.

Stay safe and healthy!



Ambassador handover

As they approach the end of their degrees, the latest round of ambassadors are resigning from their duties to focus on thesis writing. Thank you so much to Emma Braysher, Caitlin Thomson, Leonardo Del Bino, Ben Webster, Rhiann Canavan and Michael Woodley who helped make the PGI what it is today. Your real dedication and creativity in delivering the best for the PGRs has made a huge difference and we wish you all the very best in completing the final stages of your degree!

We are pleased to welcome Keir Murphy and Peter Hou from the University of Strathclyde, and Dannielle Cox-Pridmore from Surrey University who have now joined the PGI Ambassador team. Thank you to Hannah Cook, Dan Flintoft, and Lewis Hill for staying on.

If anyone is interested in becoming an ambassador please get in touch with us pgi@npl.co.uk



NPL help in the fight against antibiotic resistance

Two PGI researchers, Irene Marzuoli and Katharine Hammond, are involved in an exciting project on a novel approach to tackling infections and superbugs; their work has received widespread coverage.

They are part of NPL's Biometrology Group, who have recently been featured in The Times and the Daily Mail newspapers for developing an artificial 'virus' to help fight bacteria that have developed antibiotic resistance. These viruses have been designed to home in on and damage bacterial cells, without toxicity to the human body.

This work is described in a paper published in ACS Nano by Max Ryadnov and colleagues Ibolya Kepiro, Irene Marzuoli, Katharine Hammond, Helen Lewis, Michael Shaw, Smita Gunnoo and Emilian De Santis.

Read the full story here:

<https://www.npl.co.uk/news/scientists-create-virus-in-the-fight-against-super>

PhD student leads paper on nature's most deformed nuclei

NPL-based PGI PhD student Rhiann Canavan, along with NPL co-authors Paddy Regan, Sean Collins and Giuseppe Lorusso, have published a paper in Physical Review C entitled 'Half-life measurements in $^{164,166}\text{Dy}$ using g-g fast-timing spectroscopy with the nu-Ball Spectrometer'.

The authors established that the measured deformation in the radioisotope dysprosium-166 is amongst the highest in the entire nuclear chart. This provided a robust test for the most up to date theoretical explanations of nuclear structure physics and how the nuclear interactions between protons and neutrons vary by element. This work has a valuable impact on nuclear structure physics, as well as adding to NPL Nuclear Metrology group's long-term ambitions of addressing the primary standardisations of novel radionuclide materials.

Rhiann is co-funded by the STFC (UK) via the UK Nuclear Data Network and also by the Marion Redfearn Trust. The paper, 'Half-life measurements in $^{164,166}\text{Dy}$ using g-g fast-timing spectroscopy with the nu-Ball Spectrometer, R.L.Canavan et al., Physical Review C 101, 024313 (2020)' can be downloaded at:
<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.101.024313>

Half-life measurements in $^{164,166}\text{Dy}$ using γ - γ fast-timing spectroscopy with the ν -Ball spectrometer

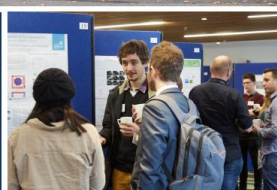
R. L. Canavan et al.
Phys. Rev. C **101**, 024313 – Published 26 February 2020

THE PGI IN 2019

THE POSTGRADUATE INSTITUTE FOR MEASUREMENT SCIENCE



Chris Skidmore, Science Minister, tweeted about his inspiring visit to NPL and the fantastic doctoral students he met.

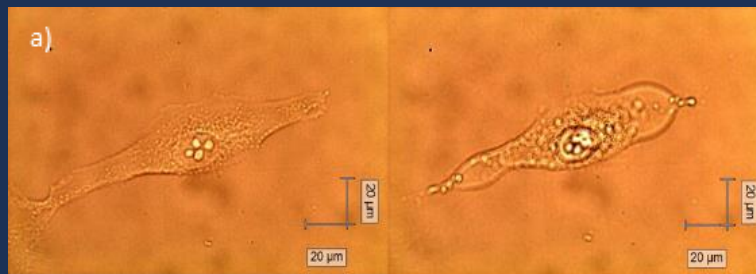


We are delighted to announce the release of another amazingly creative annual update in the form of 'A Year in the PGI 2019'. Please read and share with your community the second issue of 'A Year in the PGI'. This edition highlights some of what our postgraduate researchers have achieved throughout the year and illustrates how they continue to make an impact by carrying out ground-breaking PhD research, building their skills and developing connections across broad and diverse networks.

We would like to thank Ben Webster and Emma Braysher for their efforts in bringing the review together and for all their contribution to make our branding what it is now!

Do get in touch at pgi@npl.co.uk if you would like to be featured in this year's edition.

Student wins Francis Dunstan Travel Award



Visible light images of a single live cell before and after Raman analysis

We would like to congratulate Caitlin Thomson, from the University of Strathclyde, for winning the Francis Dunstan Travel Award.

The Francis Dunstan Travel Award has been established to recognise and support an outstanding PhD student through financial support to present their research to an international audience annually at either the International Conference on Advanced Vibrational Spectroscopy or the International Conference for Raman Spectroscopy which happen on an alternating bi-annual basis. The award is named in memory of Dr Francis Elliott Dunstan to honour his bequest to the Infrared & Raman Discussion Group (IRDG) and in recognition of his support for the IRDG.

The travel award will allow Caitlin to attend the International Conference on Raman Spectroscopy, held in Rome in August 2020, where she hopes to present her work on using Raman spectroscopy to analyse live cell samples. Biological samples, such as live cells, are inherently sensitive, and as Raman spectroscopy uses a high-powered laser as its illumination source, it can lead to sample damage and chemical changes within these sensitive biological samples which can interfere with any diagnosis or analysis being performed on them. Caitlin's work focuses on determining laser exposure limits of live cells using a combination of Raman spectroscopy and biological viability techniques to help create a type of exposure limit framework that could potentially be applied to any biological sample undergoing Raman analysis.

PGL student awarded scholarship

Tom Dixon from NPL Quantum Information Processing group and Royal Holloway, University of London was sponsored by the International School and Symposium of Nanoscale Transport and Photonics to present his work on Josephson travelling wave parametric amplifiers. The symposium included talks given by Nobel Laureate Prof. Klaus von Klitzing and Prof. Yasunobu Nakamura. This opportunity allows him to meet other scientists in the field of matter physics around the world. His current work has been consolidated into a paper and now under review. The research paper is "capturing complex behaviour in Josephson travelling wave parametric amplifiers".

Delivering an award-winning presentation

Minal Patel, from the University of Surrey, has been awarded the first prize in two competitions for lecturing on her project work. Minal's accomplishments began with her very first experience of presenting verbally outside of her institution.

Her initial lecture, on characterising thermal barrier coatings for gas turbine engines, was given at the 10th International Charles Parsons Turbine and Generator Conference in September, where she won The Institute of Materials, Minerals and Mining Young Person's Lecture competition. This win has now placed her in the national competition for the award, which will take place in April.

Minal's second presentation was at the annual meeting of The Society of Electron Microscope Technology (SEMT) at the National History Museum. She impressed the audience so much, that they awarded her the winner of the RMS Beginners lecture competition. For more information: <https://www.iom3.org/yplc-parsons-conference-finalistminal-patel>

Congratulations Minal!

Minal collecting her award



STEM for Britain

The PGI was represented at STEM for Britain once again this year. The annual event gives researchers the opportunity to present their work in Parliament.

Jasmine Bone, from the University of Surrey, presented her research on the durability of composites in marine environments. Jasmine looks at how certain materials, used for wind turbines and subsea platforms, break down under environmental conditions and how that degradation then affects the material performance.

Jasmine had the chance to talk to a range of people about her research and NPL. An important aim of the event was to encourage interaction between parliament and researchers; Munira Wilson, MP for Twickenham, attended the event and engaged with Jasmine and her work.

Whilst an overall win wasn't on the cards for this year, Jasmine, who tweeted throughout the day, won the prize for 'Tweet of the Session' and was presented with a bottle of champagne as her prize.



Jasmine was awarded the 'Tweet of the Session' prize

Fundamentals of Metrology on Tour ...

By Linden Fradet

As a result of deepening engagement with NPL, the University of Edinburgh invested in 'Fundamentals of metrology' (FoM) training for EPSRC PhD students across the University, normally a week-long course comprising lectures on the SI units as well as lab tours.

Many of you will know that part of NPL's commitment as a public sector research establishment is to provide education and support through training. Conveying the importance, excitement and impact of metrology is something our scientists are well-versed in, so it's little wonder the first in our Fundamentals of Metrology series outside of Teddington was a huge success. Thermal, dimensional and mass metrology courses were scheduled for delivery in March and April 2020, but unfortunately 2 of the 3 courses have been postponed due to You-Know-What.

However, we are pleased to report that the thermal metrology course launched the series with a bang. The course did not disappoint, as overwhelmingly students gave it the thumbs up, engaged with the Scientists and continued to pose questions throughout the day. The team have set the bar in Edinburgh, demonstrating the technology and paving the way for delivering training remotely. Fundamentals of Metrology may be on hold for now, but the principles and practices will become second nature in the weeks and months ahead, so perhaps it's just as well we are ahead of the curve.

Many thanks to Ed Davis and colleagues in the training team, and of course to the scientists in Temperature and Humidity, Dimensional, and Mass Metrology involved in these lectures.

... and at Home

Speaking of which, within days of the Edinburgh training, Time and Frequency colleagues were matching the bar, running the 'second' and 'Ampere' equivalent courses to students from UCL. Covering topics from atomic clocks, timekeeping and optical frequency combs to quantum hall and single-electronics, not to mention the volt and the ohm; students were the first to receive this pioneering material. Huge effort went into producing and delivery this course, which was well received by the 'Delivering Quantum Technologies' CDT students with many welcoming the range of topics and knowledge shared. This course was part-funded by NPL funding secured by Kadeshia Dunn.

Special thanks to all those who contributed to this achievement.



A PhD RESEARCHER GUIDE TO COVID-19

In these unprecedented times, many of us are finding ourselves without the ability to perform lab work and are having to self-isolate.

Here we explore some of the options for PhD researchers in this uncertain period to help alleviate pressure, guide productivity and maintain mental wellness.

WORK ON PAPERS



Use this time to write up papers for publication. Not enough data? No problem! Write about what you expect to see and collect the data/modify the draft when you return.

CREATE TEST PLANS



Plan out your experiments so that when you get back in the lab you can be super efficient with your remaining time. Don't underestimate the importance of thinking time!



CREATE A SCHEDULE

Think about creating a schedule to stick too, as well as using tools like the pomodoro method to manage your time. Remember no one works solidly all day - take breaks!

LEARN TO CODE



Automating data processing by investing in your ability to code will ultimately make your lab work faster and smoother when you return to the lab.

TAKE TIME FOR YOU

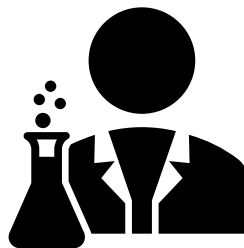


Isolation can take its toll. Make sure to take time for you, doing other things you enjoy. Most importantly, look after your health. Family and your wellness comes first!

LET GO OF THE GUILT



Remember, everyone is in the same position and productivity will drop. COVID-19 is *not* your fault. Doing what you can is good enough.



WRITE YOUR INTRO



Take this opportunity to review your field, understand seminal work and write your thesis introduction. Consider writing a review article - this often can be used as an introduction!



CONNECT WITH COLLEAGUES

Use online tools to speak to colleagues such as Zoom/Skype. Consider team coffee breaks or lunches too! Use this time to connect with collaborators across the globe.



BUILD YOUR EXPERIMENTAL

You know roughly what techniques you will use. Write about how the techniques work and detail your procedures from your lab books. If your lab books are, well, lacking - time to fix that!



MAKE BEAUTIFUL FIGURES

Often neglected - make some great figures to go in your thesis. Use the time to get to grips with graphical software - a skillset useful beyond the PhD.

PGI Annual Conference update

Unprecedented times call for bold and innovative changes! There will not be an 'in-person' conference on 29th & 30th October as scheduled. Instead, the Conference Committee are working to bring PGI students a programme of talks, career sessions, socials and more that will take place throughout 2020. Keep an eye out for emails and calendar invites – we hope to see you virtually and in person soon!

Training

Replacing the Training calendar this month we recommend the following webinars, short videos and resources that you may benefit from:

- Free [E-learning from NPL](#) to help and to ensure students and those working in academia are able to continue to develop industry applicable skills – *available until 30 June 2020*
- Free webinar [Adapting Postgraduate Education for Remote Delivery](#) - 15 April 2020, 3pm
- National Instruments have made all [online courses](#) available for free, until at least the end of April
- Subscribe to [Academic Life](#) to access resources and webinars for aspiring academics, weekly emails with hints and tips to keep you on track
- If you really want to optimize your day, try a time tracking app like [Toggl](#), which lets you manually track each task as you do it, and it's a great planning tool

Contact us

PGI team:

Richard Burguete, *Director*
richard.burguete@npl.co.uk

Leah Chapman, *University Liaison Manager (South)*
leah.chapman@npl.co.uk

Linden Fradet, *University Liaison Manager (North)*
linden.fradet@npl.co.uk

Debbie Meikle, *PGI Development Officer*
Debbie.Meikle@npl.co.uk

Lauren Livingstone, *PGI Administrator*
Lauren.Livingstone@npl.co.uk

Other contacts:

PGI Ambassadors
pgiambassadors@npl.co.uk

Short videos:

- [How simple ideas lead to scientific discoveries](#)
- [Things about a PhD nobody told you about](#)
- [Reimagining the PhD](#)
- [Public speaking](#)
- [PhD survival](#)

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