# UK Nuclear Activity

June 2024 Issue 131

In this issue,



Newsletter archive: http://npg.dl.ac.uk/OutreachNewsletter/index.html

Nuclear Physics Public Engagement Website: NuclearPhysicsForYou

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***1. Nuclear Physics Publications for June****

If you are publishing a paper that you think would be of media value, please contact Wendy Ellison, STFC Press Officer. She can help with press releases and publicity. If you get in touch with her before publication, she can also get material ready in advance for the day of publication.

Phys. Rev. Lett. **132** 242301 (2024) (https://doi.org/10.1103/PhysRevLett.132.242301)
Modification of $\chi_{c1}(3872)$ and $\psi(2S)$ Production in $p$Pb Collisions at $\sqrt{s_{NN}}$=8.16 TeV
R. Aaij *et al.* (LHCb Collaboration)
Published 13 June 2024

Phys. Lett. B **855** 138806 (2024) (https://doi.org/10.1016/j.physletb.2024.138806)
First observation of excited states in $^{120}$La and its impact on the shape evolution in the A ≈ 120 mass region
P. M. Jodidar *et al.*
Published 27 June 2024

Phys. Lett. B **855** 138805 (2024) (https://doi.org/10.1016/j.physletb.2024.138805)
The shape of the $T_z$ = +1 nucleus $^{94}$Pd and the role of proton-neutron interactions on the structure of its excited states
A. Yaneva *et al.*
Published 26 June 2024

Edited by Jack Henderson, IOP Nuclear Physics Group Committee
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Phys. Lett. B **855** 138770 (2024) (https://doi.org/10.1016/j.physletb.2024.138770)
Strong coupling effects on near-barrier $^{15}$C + $^{208}$Pb elastic scattering
V.G. Távora *et al.*
Published 14 June 2024

Phys. Lett. B **855** 138780 (2024) (https://doi.org/10.1016/j.physletb.2024.138780)
Measurement of nuclear interaction cross sections towards neutron-skin thickness determination
L. Ponnath *et al.*
Published 10 June 2024

Phys. Rev. C **109** 064322 (2024) (https://doi.org/10.1103/PhysRevC.109.064322)
Editor's Suggestion
Nuclear mass predictions using machine learning models
Esra Yüksel, Derya Soydaner, and Hüseyin Bahtiyar
Published 25 June 2024

Phys. Rev. C **109** 064321 (2024) (https://doi.org/10.1103/PhysRevC.109.064321)
$\beta$ decay of the ground state and of a low-lying isomer in $^{216}$Bi
B. Andel et al. (IDS Collaboration)
Published 24 June 2024

Phys. Rev. C **109** 064627 (2024) (https://doi.org/10.1103/PhysRevC.109.064627)
Direct capture cross section and resonances in the $^{22}$Ne$(p,\gamma)^{23}$Na reaction at low energy
M. P. Takács et al. (LUNA Collaboration)
Published 28 June 2024

Phys. Rev. C **109** 064903 (2024) (https://doi.org/10.1103/PhysRevC.109.064903)
New metric improving Bayesian calibration of a multistage approach studying hadron and inclusive jet suppression
W. Fan et al. (JETSCAPE Collaboration)
Published 6 June 2024

Phys. Rev. C **109** 065202 (2024) (https://doi.org/10.1103/PhysRevC.109.065202)
Systematic study of flow vector fluctuations in $\sqrt{s_{NN}}$=5.02 TeV Pb-Pb collisions
S. Acharya et al. (ALICE Collaboration)
Published 13 June 2024

Phys. Rev. C **109** 065205 (2024) (https://doi.org/10.1103/PhysRevC.109.065205)
Double-pion electroproduction off protons in deuterium: Quasifree cross sections and final-state interactions
Iu. A. Skorodumina et al. (CLAS Collaboration)
Published 17 June 2024

Phil. Trans. Royal Soc. A **382** 20240057 (2024) (http://doi.org/10.1098/rsta.2024.0057)
Second-order optimization strategies for neural network quantum states
M. Drissi, J. W. T Keeble, J. Rozalén Sarmiento and A. Rios
Published 24 June 2024

Phil. Trans. Royal Soc. A **382** 20230119 (2024) (https://doi.org/10.1098/rsta.2023.0119)
Electromagnetic properties of nuclei from first principles: a case for synergies between experiment and theory
R. Roth and M. Petri
Published 24 June 2024

Phil. Trans. Royal Soc. A **382** 20230124 (2024) (https://doi.org/10.1098/rsta.2023.0124)
Hyperons in neutron stars: studies of hyperon spectroscopy and the hyperon–nucleon interaction with the K-long Facility
N. Zachariou, S. Fegan, D. Watts and M. Bashkanov
Published 24 June 2024

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***2. News to Report***

***a. NSTAR 2024 hosted at University of York***

The 14th International Conference on the Physics of excited nucleons (NSTAR) was organised and hosted by the University of York Hadron Physics Group (wider organising committee: Nick Zachariou, Mikhail Bashkanov, Dan Watts, Bryan McKinnon, Daria Sokhan, Phil Cole) between June 17-21st. The successful workshop brought together more than 100 delegates from Europe, the Americas, and Asia to discuss the current progress and future prospects on the physics of the Baryon spectrum and the structure of excited nucleons. The workshop focused on highlighting new experimental results utilising photo-, electro-, and hadron- production reactions, as well as e+e- and ion collisions to study aspects of the baryon spectrum, including reaction amplitudes, electrocouplings, and the excited nucleon structure. Advancements in theoretical approaches, using effective field theories, QCD-inspired models, Schwinger-Dyson approaches to QCD, and first principle calculations (lattice QCD) were also discussed in detail, and the workshop provided an invaluable venue for synergies between theory and experiments.

A 2-and-a-half-day long early career workshop preceded NSTAR, which brought together researchers and professionals from academia and industry to discuss career prospects both in academia and industry, as well as fellowship opportunities in the UK, Europe, Asia and the US. The workshop also provided panel discussion and hands-on sessions on CV building, Fellowship proposal and grant writing, equipping attendees with practical skills and knowledge, enhancing their ability to secure funding and advance their academic and professional careers.

The conference and workshop were sponsored by STFC, IOP, NUPECC, STRONG2020, JSA, JLab, CAEN, KC Scientific, and Micron Semiconductor Ltd.

*Contribution from Nick Zachariou, University of York*

***b. University of York-Indian Institute of Technology Bombay inaugural workshop success***

On Monday 1st July 2024, the University of York ran a workshop to kick off an exciting UK-India partnership - noted in the March 2024 newsletter - focused on semiconductors and their applications in detector technologies. The partnership team (Dr Samadhan Patil, Prof David Jenkins, and Dr Adam Featherstone) brought together staff from across UoY and hosted industry guests from Createc, LabLogic,

newcleo, Nuclear AMRC, Sellafield, and Tracerco. We were delighted to be joined by Ms Nidhi Choudhary from the High Commission of India, and look forward to getting stuck into the planned detector development following a reciprocal workshop in Mumbai in August 2024.

*Contribution from Adam Featherstone, University of York*

***c. Nuclear Physics Special Issue of Phil. Trans. Royal Soc. A***

Prof Marina Petri (University of York) and Prof Alexandros Gezerlis (University of Guelph) have guest-edited a theme issue for the Philosophical Transactions of the Royal Society A. This is the world's longest running scientific journal, celebrating its 350th anniversary in 2015, and has an illustrious history, featuring contributions by Isaac Newton, James Clerk Maxwell, Charles Darwin, and Michael Faraday.

The theme issue is titled "The liminal position of Nuclear Physics: from hadrons to neutron stars"

Nuclear physics plays a central role in our understanding of both the atomic nucleus and seemingly unrelated things, e.g. our understanding of the interaction of neutrinos with matter, or how stars are born and die. With this theme issue, we are bringing together contributions from prominent researchers in the field in order to showcase the vibrancy of nuclear physics, covering a broad selection of current frontier topics. Central to this theme issue is the interplay between experiment and theory as the driving force of breakthroughs in the field. We have enjoyed working with the authors, referees and the editorial office in putting this theme issue together. We hope the reader will, too.

You can find all articles here: https://royalsocietypublishing.org/toc/rsta/2024/382/2275

*Contribution from Marina Petri, University of York*

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***3. Outreach Activity***

***a. York Soapbox Science***

A Soapbox Science event was hosted in York (http://soapboxscience.org). Soapbox Science aims to provide a platform for gender marginalised researchers to showcase their research to the public. Researchers don white lab coats and stand on soapboxes, using props and accessible language to entice the public to learn about their work. Sophie Abrahams, a nuclear astrophysics PhD student at the University of York, took part in the York branch of Soapbox Science and spoke about how gold and platinum are produced in neutron star mergers. Using tupperware boxes full of lego and tennis balls, she spent an hour on the soapbox sharing concepts with the public which built up to the idea of colliding neutron stars creating gold and platinum.

Starting with the idea that gravity attracts things by dropping many tennis balls, and then introducing the idea of nuclear fusion through the sticking together of lego bricks, Sophie also illustrated how much energy a neutron star merger produces by considering how long she would need to boil all of the kettles in the UK for (the answer is that she could have started boiling all of the kettles in the UK when dinosaurs roamed the Earth and by today she would have barely used 1% of all of the energy released in the neutron star merger). The crowd varied from two people to ten as the hour passed, and passersby asked questions ranging from what the closest neutron star merger to the Earth was to how the concepts discussed could be applied to solve the energy crisis.

*Contribution from Sophie Abrahams, University of York*

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**4. Media Interactions**

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