UK Nuclear Activity

December 2017 Issue 54

In this issue,

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

Nuclear Physics Public Engagement Website: www.stfc.ac.uk/NuclearPhysicsForYou

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1. Nuclear Physics Publications for December*

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. 119, 222501 (2017) https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.119.222501
Role of Multichance Fission in the Description of Fission-Fragment Mass Distributions at High Energies
K. Hirose[1,*], K. Nishio[1], S. Tanaka[2], R. Léguillon[1], H. Makii[1], I. Nishinaka[1], R. Orlandi[1], K. Tsukada[1], J. Smallcombe[3,1], M. J. Vermeulen[1], S. Chiba[4], Y. Aritomo[2], T. Ohtsuki[5], K. Nakano[6], S. Araki[6], Y. Watanabe[6], R. Tatsuzawa[7], N. Takaki[7], N. Tamura[8], S. Goto[8], I. Tsekhanovich[9], and A. N. Andreyev[10,1]
*Published 27 November 2017

Rep. Prog. Phys. 81, 016301 (2017) http://iopscience.iop.org/article/10.1088/1361-6633/aa82eb
Nuclear fission: a review of experimental advances and phenomenology
A N Andreyev[1,2], K Nishio[2] and K-H Schmidt[3]
*Published 29 November 2017

Phys. Rev. C 96, 064601 (2017) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.96.064601
Measurement of the ^{238}U(n,γ) cross section up to 80 keV with the Total Absorption Calorimeter at the CERN n_TOF facility
T. Wright *et al.* (The n_TOF Collaboration)
Published 1 December 2017

Phys. Rev. C 96, 064307 (2017) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.96.064307
Reinvestigation of the excited states in the proton emitter ^{151}Lu: Particle-hole excitations across the N=Z=64 subshell
F. Wang[1], B. H. Sun[1,*], Z. Liu[2,3,†], C. Qi[4,‡], L. H. Zhu[1], C. Scholey[5], S. F. Ashley[3], L. Bianco[6], I. J. Cullen[3], I. G. Darby[7],

*Also including missed publications from previous months.

S. Eeckhaudt[5], A. B. Garnsworthy[8], W. Gelletly[3], M. B. Gomez-Hornillos[9], T. Grahn[5], P. T. Greenlees[5], D. G. Jenkins[10], G. A. Jones[3], P. Jones[11], D. T. Joss[6], R. Julin[5], S. Juutinen[5], S. Ketelhut[5], S. Khan[12], A. Kishada[12], M. Leino[5], M. Niikura[13], M. Nyman[14], R. D. Page[6], J. Pakarinen[6], S. Pietri[15], Zs. Podolyák[3], P. Rahkila[5], S. Rigby[6], J. Sarén[5], T. Shizuma[16], J. Sorri[5], S. Steer[3], J. Thomson[6], N. J. Thompson[3], J. Uusitalo[5], P. M. Walker[3], and S. Williams[3]
Published 6 December 2017

MNRAS 474, 3133 (2017) https://academic.oup.com/mnras/article/474/3/3133/4710302
Uncertainties in the production of *p* nuclides in thermonuclear supernovae determined by Monte Carlo variations
N Nishimura(西村信哉), T Rauscher, R Hirschi, A St J Murphy, G CescuttiC Travaglio
Published 07 December 2017

Eur. Phys. J. C (2017) 77:852 https://link.springer.com/article/10.1140/epjc/s10052-017-5412-6
Charged-particle multiplicity distributions over a wide pseudorapidity range in proton-proton collisions at √s = 0.9, 7, and 8 TeV
ALICE Collaboration, UK Authors: H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, K. L. Graham, C. Hills, P. G. Jones, A. Jusko, M. Krivda, R. C. Lemmon, R. Lietava, S. W. Lindsay, J. Norman, O. Villalobos Baillie, E. Willsher, N. Zardoshti
Published 9 December 2017

Phys. Rev. Lett. 119, 242701 (2017) https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.119.242701
Direct Measurement of the Key $E_{c.m.}$=456 keV Resonance in the Astrophysical $^{19}Ne(p,\gamma)^{20}Na$ Reaction and Its Relevance for Explosive Binary Systems
R. Wilkinson[1], G. Lotay[1,2], A. Lennarz[3], C. Ruiz[3], G. Christian[4,5,6], C. Akers[3,*], W. N. Catford[1], A. A. Chen[7], D. Connolly[3], B. Davids[3], D. A. Hutcheon[3], D. Jedrejcic[8], A. M. Laird[9], L. Martin[3], E. McNeice[7], J. Riley[9], and M. Williams[3,9]
Published 11 December 2017

Phys. Rev. C 96, 064310 (2017) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.96.064310
Structure of ^{55}Sc and development of the N=34 subshell closure
D. Steppenbeck[1,*], S. Takeuchi[2], N. Aoi[3], P. Doornenbal[1], M. Matsushita[4], H. Wang[1], H. Baba[1], S. Go[4,†], J. D. Holt[5], J. Lee[1,‡], K. Matsui[6], S. Michimasa[4], T. Motobayashi[1], D. Nishimura[7], T. Otsuka[4,6,†], H. Sakurai[1,6], Y. Shiga[8], P.-A. Söderström[1,§], S. R. Stroberg[5], T. Sumikama[9,†], R. Taniuchi[1,6], J. A. Tostevin[10], Y. Utsuno[11], J. J. Valiente-Dobón[12], and K. Yoneda[1]
Published 11 December 2017

Phys. Rev. Lett. 119, 242301 (2017) https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.119.242301
J/ψ Elliptic Flow in Pb-Pb Collisions at $\sqrt{s_{NN}}$ = 5.02 TeV
ALICE Collaboration, UK Authors: H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, K. L. Graham, C. Hills, P. G. Jones, A. Jusko, M. Krivda, R. C. Lemmon, R. Lietava, S. W. Lindsay, J. Norman, O. Villalobos Baillie, E. Willsher, N. Zardoshti
Published 15 December 2017

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2. News to Report

a. Mapping the future of UK nuclear physics research

Article taken from STFC News

Nuclear physicists from across Europe, gathered in Brussels at the end of November, to hear the announcement of an updated strategy – that will guide the community's research priorities in the coming years. This event was attended by Alex Murphy (Edinburgh), Paul Nolan (Liverpool), John Simpson (STFC Daresbury), David Ireland (Glasgow), Jenny Hiscock (STFC) and Taj Panesor (IoP).

The European Science Foundation's (ESF) Nuclear Physics European Collaboration Committee (NuPECC) has announced its fifth Long Range Plan, which sets out the goals of nuclear physicists in Europe.

Professor John Simpson, head of STFC's nuclear physics division, sat on one of the working groups which contributed to the plan. The working groups were asked to set out the most promising physics in their subfields, to highlight recent achievements, and to discuss future perspectives.

He said: "This report defines and will potentially drive the future of the UK physics

research landscape throughout the next decade."
The plan features recommendations from NuPECC and the nuclear physics community for the development of nuclear physics research in Europe followed by a comprehensive chapter on large and smaller facilities, existing, under construction or planned.
Recommendations include urgently completing the construction of FAIR (the Facility for Antiproton and Ion Research), supporting ALICE and the heavy-ion programme at the Large Hadron Collider at CERN with the planned experimental upgrades and continuing to pursue new applications for nuclear physics such as adapted techniques for cancer treatment.
Professor Angela Bracco, Chair of NuPECC, said: "It is strongly hoped that this plan will be well exploited by the European funding agencies to seek avenues for accomplishing the objectives outlined in the recommendations, in particular also those that go beyond the capabilities of an individual country."
The Long Range Plan is available to view online on the NUPECC website.
Contribution by Alexander Murphy a.s.murphy@ed.ac.uk (Edinburgh) and John Simpson john.simpson@stfc.ac.uk (STFC Daresbury)

b. ISOLDE Solenoidal Spectrometer (ISS) update

The ISOL-SRS project is developing 2 spectrometer systems to study nuclear reactions induced by radioactive ion beams. In the February newsletter we reported the successful recommissioning of the 4T ex-MRI magnet for one of these spectrometers, the ISOLDE Solenoidal Spectrometer (ISS), by a team from Daresbury supported by CERN's cryogenics experts. That milestone paved the way for the magnet to be moved into the ISOLDE Hall in early March, allowing the third HIE-ISOLDE beam line to be constructed on schedule. The magnet was installed on its base frame, surveyed into position and connected to the beam line in June (figure 1a). November saw the construction of the magnetic shielding around the magnet (figure 1b) and mapping the magnetic field, followed in December by tuning a beam through the magnet and observing its profile as the magnetic field was ramped up and down. The collaboration is now working towards first experiments using the magnet with a Si array from HELIOS (Argonne) in the second half of 2018.
The ISOL-SRS project team is continuing to make progress on the mechanical infrastructure, the readout system and the Si detectors, which are being tested in Liverpool. The project received a boost with funding for ancillary detectors being awarded in the recent Consolidated Grant round. These included a recoil detector, which is being designed by Manchester. The ISS is due to be completed in 2019 and be available for physics exploitation after the second long shutdown at CERN (LS2).
Finally, an ISS physics workshop took place in Manchester in July and was well attended, with several new collaborators participating. Anyone interested in performing experiments with the ISS is welcome to contact us. Further information on the project is available at http://npg.dl.ac.uk/isol-srs/index.html.
Contribution by Robert Page rdp@ns.ph.liv.ac.uk (Liverpool)

Figure 1 Photographs of the ISS magnet (a) on its base frame and connected to the beam line and (b) inside the magnetic shielding.

3. Outreach Activity

IoP South Central Branch talk
On 6th December Chantal delivered an IoP public talk to almost 100 people at the University of Surrey covering the past, present and future of fusion energy research. The talk, titled "Fusion Energy: Harnessing the Power of a Man-Made Sun" followed the journey of fusion research in the UK from early fusion devices, like ZETA, through to ITER which is currently under construction.
Contribution by Chantal Nobs
chantal.nobs@ukaea.uk (Culham Centre for Fusion Energy)

Outreach Talk
On December 1st John Roberts gave a two hour presentation on the Perception vs Reality of Nuclear Energy to over 100 members of the Fleet branch of the University of the Third Age. With the majority of the audience having spent their career at Farnborough there were many questions on the future plans for nuclear technology in the UK, plus discussions on radiation doses in aeroplanes and spaceflight.
Contribution by John Roberts
j.w.roberts@manchester.ac.uk (Manchester)

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4. Media Interactions

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