UK Nuclear Activity

February 2015 Issue 20

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 February

If you are publishing a paper that you think would be of media value please let Wendy Ellison wendy.ellison@stfc.ac.uk , STFC Press Officer, know. 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.

Nucl. Phys. A 934, 1 (2015) http://www.sciencedirect.com/science/article/pii/S0375947414005533
Test of the SO(6) selection rule in ^{196}Pt using cold-neutron capture
J. Jolie[a,*], J.-M. Régis[a], D. Wilmsen[a], N. Saed-Samii[a], M. Pfeiffer[a], N. Warr[a], A. Blanc[b], M. Jentschel[b], U. Köster[b], P. Mutti[b], T. Soldner[b], G.S. Simpson[c,i], G. De France[d], W. Urban[e], F. Drouet[c], A. Vancraeyenest[c], A.M. Bruce[f], O.J. Roberts[f], L.M. Fraile[g], V. Paziy[g], A. Ignatov[h], Th. Kröll[h], D. Ivanova[j], S. Kisyov[j], S. Lalkovski[j,k], Zs. Podolyak[k], P.H. Regan[k,l], E. Wilson[k], W. Korten[m], C.A. Ur[n,o], R. Lica[o], N. Marginean[o]
Published February 2015

Phys. Lett. B 741, 128 (2015) http://www.sciencedirect.com/science/article/pii/S0370269314008892
Separation of the $1^+/1^-$ parity doublet in ^{20}Ne
J. Beller[a,*], C. Stumpf[a], M. Scheck[a,b,c], N. Pietralla[a,*], D. Deleanu[e], D.M. Filipescu[e], T. Glodariu[e], W. Haxton[f], A. Idini[a], J.H. Kelley[h], E. Kwan[d,1], G. Martinez-Pinedo[a,g], R. Raut[d,2], C. Romig[a], R. Roth[a], G. Rusev[d,3], D. Savran[i,j], A.P. Tonchev[d,4], W. Tornow[d], J. Wagner[a], H.R. Weller[d], N.-V. Zamfir[e], M. Zweidinger[a]
Published 4 February 2015

Phys. Lett. B 741 38 (2015) http://www.sciencedirect.com/science/article/pii/S0370269314008302
Multiplicity dependence of jet-like two-particle correlation structures in p–Pb collisions at $\sqrt{s_{NN}}$ = 5.02 TeV
B. Abelev et al. (ALICE Collaboration), UK Authors: D. Alexandre, L.S. Barnby, D. Evans, M.A.S. Figueredo, L.D. Hanratty, P.G. Jones, A. Jusko, M. Krivda, G.R. Lee, R.C. Lemmon, R. Lietava, J. Norman, R. Romita, O. Villalobos Baillie
Published 4 February 2015

Phys. Rev. C 91, 024307 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.91.024307
Spectroscopic study of the exotic nucleus ^{25}P
B. Fernández-Domínguez[1], X. Pereira-López[1,2], N. K. Timofeyuk[3], P. Descouvemont[4], W. N. Catford[3], and F. Delaunay[2]
Published 9 February 2015

NIM A 773, 124 (2015) http://www.sciencedirect.com/science/article/pii/S0168900214010833
Characterisation of two AGATA asymmetric high purity germanium capsules
S.J. Colosimo[a], S. Moon[a], A.J. Boston[a], H.C. Boston[a], J.R. Cresswell[a], L. Harkness-Brennan[a], D.S. Judson[a], I.H. Lazarus[b], P.J. Nolan[a], J. Simpson[b], C. Unsworth[a], AGATA Collaboration
Published 11 February 2015

Phys. Rev. C 91, 024308 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.91.024308
Spectroscopy of ^{9}B via high-resolution ejectile-tagged recoil break-up
C. Wheldon[1,*], Tz. Kokalova[1], M. Freer[1], J. Walshe[1], R. Hertenberger[2], H.-F. Wirth[2], N. I. Ashwood[1], M. Barr[1], N. Curtis[1], Th. Faestermann[3], R. Lutter[2], J. D. Malcolm[1], and D. J. Marín-Lámbarri[1]
Published 11 February 2015

Phys. Rev. C 91, 027302 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.91.027302
Lifetime of the yrast $I^{\pi} = 5^{-}$ state and E1 hindrance in the transitional nucleus ^{136}Ce
T. Alharbi[1,2], P. H. Regan[2,3], N. Mărginean[4], Zs. Podolyák[2], O. J. Roberts[5], A. M. Bruce[5], N. Alkhomashi[6], R. Britton[2], D. Bucurescu[4], D. Deleanu[4], D. Filipescu[4], D. Ghiță[4], T. Glodariu[4], C. Mihai[4], K. Mulholland[7], R. Lica[4], R. Mărginean[4], M. Nakhostin[2], A. Negret[4], C. R. Nita[4], L. Stroe[4], T. Sava[4], C. Townsley[2], and N. V. Zamfir[4]
Published 12 February 2015

Phys. Rev. C 91, 024609 (2015) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.91.024609
$K^*(892)^0$ and φ(1020) production in Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV
B. Abelev et al. (ALICE Collaboration), UK Authors: D. Alexandre, L.S. Barnby, D. Evans, M.A.S. Figueredo, L.D. Hanratty, P.G. Jones, A. Jusko, M. Krivda, G.R. Lee, R.C. Lemmon, R. Lietava, R. Romita, O. Villalobos Baillie
Published 17 February 2015

Phys. Rev. X 5, 011018 (2015) http://journals.aps.org/prx/abstract/10.1103/PhysRevX.5.011018
In-Source Laser Spectroscopy with the Laser Ion Source and Trap: First Direct Study of the Ground-State Properties of $^{217, 219}$Po
D. A. Fink[1,2,3,*], T. E. Cocolios[4,5], A. N. Andreyev[6,7], S. Antalic[8], A. E. Barzakh[9], B. Bastin[10], D. V. Fedorov[9], V. N. Fedosseev[1], K. T. Flanagan[4], L. Ghys[11,12], A. Gottberg[1,13], M. Huyse[11], N. Imai[14], T. Kron[15], N. Lecesne[10], K. M. Lynch[4,5,11], B. A. Marsh[1], D. Pauwels[12], E. Rapisarda[5], S. D. Richter[15], R. E. Rossel[1,15], S. Rothe[1,15], M. D. Seliverstov[6,9], A. M. Sjödin[10], C. Van Beveren[11], P. Van Duppen[11], and K. D. A. Wendt[15]
Published 20 February 2015

Phys. Rev. C 91, 024616 (2015) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.91.024616
Emergence of a secondary rainbow and the dynamical polarization potential for ^{16}O on ^{12}C at 330 MeV
R. S. Mackintosh[*], Y. Hirabayashi[†] and S. Ohkubo[‡]
Published 23 February 2015

Phys. Rev. C 91, 024323 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.91.024323
1^{-} and 2^{+} discrete states in ^{90}Zr populated via the (^{17}O,^{17}O ′ γ) reaction
F. C. L. Crespi[1,2], A. Bracco[1,2,*], R. Nicolini[1,2], E. G. Lanza[3], A. Vitturi[4,5], D. Mengoni[4,5], S. Leoni[1,2], G. Benzoni[2], N. Blasi[2], C. Boiano[2], S. Bottoni[1,2], S. Brambilla[2], F. Camera[1,2], A. Corsi[1,2,†], A. Giaz[2], B. Million[2], L. Pellegri[1,2], V. Vandone[1,2], O. Wieland[2], P. Bednarczyk[6], M. Ciemała[6,‡], M. Kmiecik[6], M. Krzysiek[6], A. Maj[6], D. Bazzacco[5], M. Bellato[5], B. Birkenbach[7], D. Bortolato[4,5], E. Calore[8], B. Cederwall[9], G. de Angelis[8], P. Désesquelles[10], J. Eberth[7], E. Farnea[5], A. Gadea[11], A. Görgen[12], A. Gottardo[4,8], H. Hess[7], R. Isocrate[5], J. Jolie[7], A. Jungclaus[13], R. S. Kempley[14], M. Labiche[15], R. Menegazzo[5], C. Michelagnoli[4,5,§], P. Molini[8], D. R. Napoli[8], A. Pullia[1,2], B. Quintana[16], F. Recchia[4,5], P. Reiter[7], E. Sahin[8,‖], S. Siem[12], P.-A. Söderström[17,¶], O. Stezowski[18], Ch. Theisen[19], C. Ur[5], and J. J. Valiente-Dobón[8]
Published 24 February 2015

2. News to Report

a. APS: Top Ten Physics News Stories in 2014 – Element 117. Ununseptium, the placeholder name for element 117, was spotted for an instant in Germany in May. At the GSI Helmholtz Centre for Heavy Ion Research in Darmstadt, scientists bombarded a berkelium target with accelerated calcium atoms to create the short-lived artificial element. This follows up on an experiment in Russia in 2010 that first created the element, confirming its existence and likely paving the way for its official inclusion on the periodic table of the elements. In addition, one of the isotopes of lawrencium discovered in the process had a half-life of nearly eleven hours, giving physicists hope that experiments might be bringing them close to the hypothesized shores of the "Island of Stability" for super-heavy elements.
http://www.aps.org/publications/apsnews/201501/stories.cfm
Contribution by Rodi Herzberg
R.Herzberg@liverpool.ac.uk (Liverpool)

b. CRIS gets a new acquisition system. Thanks to a Small Equipment Grant from The Royal Society, the Collinear Resonance Ionisation Spectroscopy (CRIS) experiment at CERN ISOLDE has recently acquired a new digital acquisition system. The CRIS experiment is a laser spectroscopy setup where a valence electron is excited beyond the ionisation threshold via a sequence of laser radiations tuned to a specific isotope of an element. The irradiation is performed in a collinear geometry with respect to the radioactive ion beam, traveling with an energy of 40 keV, in order to reduce the velocity distribution arising from the ion source thermal distribution (Doppler compression). Altogether, high-resolution, high-efficiency laser spectroscopy can be performed (e.g. with ^{202}Fr with less than 100 ions/s [1]). The CRIS experiment is complemented by a decay spectroscopy station (DSS) consisting of a wheel hosting 8 thin carbon foils (20 µg/cm2) to collect the radioactive ions, and 4 silicon detectors (2 surrounding the implantation site, 2 surrounding a decay site, each covering ~60% of 4π) [2]. The DSS can be used in 2 ways: first, it can be used to identify the beam content, as well as tagging the observed resonances; this is particularly useful when the isotope of interest has several long-lived isomers (e.g. ^{204}Fr, see [3]). Alternatively, it can be used to study the decay of isotopes, even isomers, in unprecedented clean conditions.
The new digital acquisition system is meant to record the data from the DSS. It consists of a CAEN V1724 digitiser, with all its associated services (digital pulse processing - DPP, crate, optical link, …). This system benefits from the full support of the UK acquisition experts in Daresbury, following extensive developments in partnership with CAEN, especially on the DPP algorithm, and is fully integrated within the MIDAS acquisition package. This system has already been in place for a while at the Oliver Lodge Laboratory in Liverpool with Dr Laura Harkness-Brennan and her team and is used very successfully.
The new system has also been tested at CRIS at the beginning of the year. The installation went remarkably smoothly and we are now looking forward to using it for our coming experimental campaign, e.g. for measuring the half-lives of n-rich gallium isotopes or for tagging radium resonances.
[1] K.T. Flanagan et al., PRL 111 (2013) 212501
[2] M.M. Rajabali et al., NIMA 707 (2013) 35-39
[3] K.M. Lynch et al., PRX 4 (2014) 011055
Contribution by Thomas Cocolios
thomas.cocolios@manchester.ac.uk
(Manchester)

c. IOP Particle, Astroparticle and Nuclear Physics Conference. As already announced, the IOP Particle, Astroparticle and Nuclear Physics Conference 2015 will be held in Manchester from March 30th - April 2nd.
The abstract submission deadline has been extended to March 1st, which coincides with the "early-bird" registration deadline.
For further information regarding abstract submission, registration, accommodation and other conference details please refer to the webpages at
http://www.iop2015.manchester.ac.uk/Home.html
Contribution by Judith McGovern
judith.mcgovern@manchester.ac.uk
(Manchester)

d. Medical training facility opens at Daresbury. On 2nd February 2015 a unique medical training facility opened at the Daresbury Laboratory. It is set to give hundreds of trainee medical physicists some

vital hands-on experience with state-of-the-art medical scanners, and so in future offer better diagnostic services to patients.

Opening the facility: L-R Melvyn Carroll (RLUH), Andy Boston (UoL), John Simpson (DL), Susan Smith (DL), Steve Holloway (UoL), Sobhan Vinjamuri (RLUH), Graham Evans MP, Paul Nolan (UoL), Helen Boston (UoL), David Mowat MP, Ian Lazarus (DL).

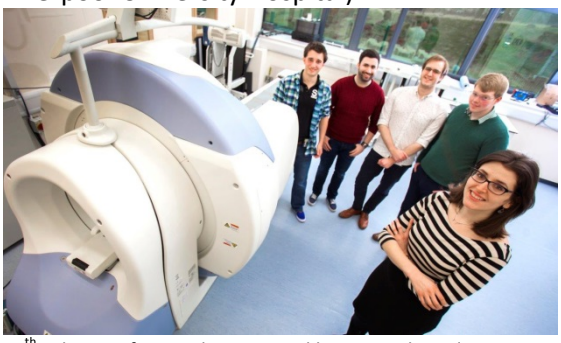
The new Medical Training and Research Laboratory (MTRL) will house a SPECT/CT scanner that will allow students to receive a first-class training experience away from the daily pressures of the hospital environment, where there is often a long wait for access to such in-demand scanning equipment. It is a joint initiative between the University of Liverpool, the Royal Liverpool University Hospital and the Science and Technology Facilities Council (STFC),

"This new facility will bring immense benefits for the trainee medical physicists and patients alike," said STFC's Ian Lazarus, who leads the MTRL project team. "Scanners are used to show doctors exactly where to find tumours, how efficiently our hearts are working or what is happening in our brains – for instance, whether a patient's symptoms are caused by Parkinson's disease, or another condition with similar symptoms. The MTRL is dedicated to teaching and research and students who train here will have allocated blocks of time to use the SPECT/CT, so will gain knowledge and skills in a much shorter timescale."

SPECT/CT scanners produce a 3D map of a patient's body so can be a key element in patient diagnosis, and hands-on experience provides medical physicists with a huge advantage. The MTRL will remove the constraints of training in a busy hospital. It will also benefit scientists, by allowing researchers to explore potential ways to improve medical imaging scanners with new technologies.

The laboratory that houses the scanner has been completely refurbished and provided with equipment with funding from STFC. The vital scanning equipment was bought and installed by the University of Liverpool.

On 24th February the MTRL welcomed its first students who were trained by Samantha Colosimo (Liverpool) and Ian Hufton (Royal Liverpool University Hospital).



24th February: first students trained by Samantha Colosimo (UoL) and Ian Hufton (RLUH).

Contribution by Ian Lazarus
ian.lazarus@stfc.ac.uk (Daresbury)

d. York appoints new Physics Professor. The University of York's Department of Physics have appointed their first professor of Nuclear Physics Theory, Professor Jacek Dobaczewski. Part of a joint initiative between York and the Science and Technology Facilities Council (STFC) to significantly strengthen the UK's nuclear physics research community, the appointment will establish new nuclear physics theory activity at York. It will be followed immediately by a search for a new Lecturer in low-energy Nuclear Physics Theory at York.

One of the world's foremost nuclear physics theorists, Professor Dobaczewski's current research focuses on deriving energy density functionals that aims to precisely describe nuclear spectroscopic data. In collaboration with colleagues in Finland and at Michigan State University, he studies exotic nuclei far from beta stability, fission properties of transfermium nuclei, shell structure and pairing correlations in nuclei.

Since 1997, Professor Dobaczewski has been Head of the Nuclear Structure Theory Division in the Institute of Theoretical Physics at the University of Warsaw. In 2006, he was awarded an Academy of Finland Distinguished Professor grant (FIDIPRO) with the aim of building up an entirely new group of theorists at the University of Jyväskylä.

Currently holding a half-time appointment as FiDi Professor at the University of Jyväskylä until 2017, he will commence half-time at York until starting full-time in January 2018. Throughout, he will retain his honorary position at the University of Warsaw.

Professor Bob Wadsworth, from York's Department of Physics, said:
""Professor Dobaczewski 's reputation in the field is well known throughout the world and his appointment is excellent news, both for the nuclear physics group at York and also for the wider UK nuclear physics community."
This new post follows a special funding award from STFC aimed at meeting a strategic need for theory and modelling support in nuclear physics research which was identified in a 2012 Institute of Physics report.
Professor John Womersley, Chief Executive of STFC, welcomed the appointment of Professor Dobaczewski : "The arrival of Professor Dobaczewski at York is the first step in applying additional funding from STFC to strengthen the UK programme in nuclear physics theory. This new collaboration between STFC and the University of York reinforces our commitment to help keep the UK at the forefront of nuclear physics research."
The new theory group will complement the work of York's experimental groups and will work closely with theory groups at Manchester and Surrey Universities, as well as other groups across Europe and beyond.
The new lecturer will follow and be in place by June 2015 and the studentship will begin in October 2015. STFC will fund the chair position for approximately three and a half years, after which time York will take on the funding of the post.
Contribution by Bob Wadsworth
rw10@york.ac.uk (York)

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3. Outreach Activity

Physics club lecture. Charlie Crisp, a student at the Skinners School in Royal Tonbridge Wells, recently started an after-school physics club so that he and other students could learn more about different areas of physics. On the 5th February Chantal Nobs, a PhD student at the University of Brighton, was invited to talk about nuclear physics and the research she is involved with. The aim of the talk was to highlight some of the opportunities that are available to students studying physics at University. Through using the Queen Mary Lego kits Chantal was able to demonstrate nuclear physics experiments and describe nuclear properties such as shape, as shown in the figure.

Contribution by Chantal Nobs
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4. Media Interactions

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