December 2014 Issue 18

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 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.

JINST 9, P11003 (2014) http://iopscience.iop.org/1748-0221/9/11/P11003/
Measurement of visible cross sections in proton-lead collisions at $\sqrt{s_{NN}}$ = 5.02 TeV in van der Meer scans with the ALICE detector
The 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 4 November 2014

Nature Physics 10, 909 (2014) http://www.nature.com/nphys/journal/v10/n12/full/nphys3165.html
Recent advances in nuclear physics through on-line isotope separation
David Gareth Jenkins
*Published 28 November 2014

J. Environ. Radioactiv. 138, 315 (2014) http://www.sciencedirect.com/science/article/pii/S0265931X14000824
The production of Neptunium-236g
S.M. Jerome[a,*], P. Ivanov[a], C. Larijani[a], D.J. Parker[b], P.H. Regan[a,c]
Published December 2014

Phys. Rev. C 90, 067301 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.067301
B(E2;$2^+_1 \rightarrow 0^+_1$) value in ^{90}Kr
J.-M. Régis[1,*], J. Jolie[1], N. Saed-Samii[1], N. Warr[1], M. Pfeiffer[1], A. Blanc[2], M. Jentschel[2], U. Köster[2], P. Mutti[2], T. Soldner[2], G. S. Simpson[3,†], F. Drouet[3], A. Vancraeyenest[3], G. de France[4], E. Clément[4], O. Stezowski[5], C. A. Ur[6], W. Urban[7], P. H. Regan[8,‡], Zs. Podolyák[8], C. Larijani[8,‡], C. Townsley[8], R. Carroll[8], E. Wilson[8], L. M. Fraile[9], H. Mach[9,§],

*Also including missed publications from previous months.

V. Paziy[9], B. Olaizola[9], V. Vedia[9], A. M. Bruce[10], O. J. Roberts[10], J. F. Smith[11], T. Kröll[12], A.-L. Hartig[12], A. Ignatov[12], S. Ilieva[12], M. Thürauf[12], S. Lalkovski[13,‖], D. Ivanova[13], S. Kisyov[13], W. Korten[14], M.-D. Salsac[14], M. Zielińska[14], N. Mărginean[15], D. G. Ghiță[15], R. Lică[15], C. M. Petrache[16], A. Astier[16], and R. Leguillon[16,¶]
Published 1 December 2014

Phys. Rev. Lett. 113, 232301 (2014) https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.113.232301
Measurement of Prompt D-Meson Production 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 December 2014

Phys. Rev. Lett. 113, 232504 (2104) http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.113.232504
Exclusive J/Ψ Photoproduction off Protons in Ultraperipheral 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 5 December 2014

JHEP 12, 073 (2014) http://link.springer.com/article/10.1007/JHEP12%282014%29073
Suppression of ψ(2S) production in p-Pb collisions at $\sqrt{s_{NN}}$ = 5.02 TeV
The 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 10 December 2014

NIM A 767, 359 (2014) http://www.sciencedirect.com/science/article/pii/S0168900214009826
Evaluation of the implementation of the R-matrix formalism with reference to the astrophysically important $^{18}F(p,\alpha)^{15}O$ reaction
D.J. Mountford[a,*], R.J. deBoer[b], P. Descouvemont[c], A. St. J. Murphy[a], E. Uberseder[b], M. Wiescher[b]
Published 11 December 2014

NIM A 767, 453 (2014) http://www.sciencedirect.com/science/article/pii/S0168900214010195
Performance analysis for the CALIFA Barrel calorimeter of the R^{3}B experiment
H. Alvarez-Pol[a,*], N. Ashwood[b], T. Aumann[c,d], D. Bertini[d], P. Cabanelas[a], E. Casarejos[e], J. Cederkall[f], D. Cortina-Gil[a], P. Díaz Fernández[a], I. Duran[a], E. Fiori[g,h], D. Galaviz[j], M. Labiche[j], E. Nacher[k], B. Pietras[a], D. Savran[g,h], O. Tengblad[k], P. Teubig[i]
Published 11 December 2014

Phys. Lett. B 739, 139 (2014) http://www.sciencedirect.com/science/article/pii/S0370269314007576
Freeze-out radii extracted from three-pion cumulants in pp, p–Pb and Pb–Pb collisions at the LHC
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 12 December 2014

NIM B 317, 565 (2014) http://www.sciencedirect.com/science/article/pii/S0168583X13007088
The Collinear Resonance Ionization Spectroscopy (CRIS) experimental setup at CERN-ISOLDE
T.E. Cocolios[a,b,*], H.H. Al Suradi[c], J. Billowes[a], I. Budinčević[d], R.P. de Groote[d], S. De Schepper[d], V.N. Fedosseev[e], K.T. Flanagan[a], S. Franchoo[f], R.F. Garcia Ruiz[d], H. Heylen[d], F. Le Blanc[f,1], K.M. Lynch[a,b], B.A. Marsh[e], P.J.R. Mason[g,2], G. Neyens[d], J. Papuga[d], T.J. Procter[a], M.M. Rajabali[d,3], R.E. Rossel[e,h], S. Rothe[e,h], G.S. Simpson[i], A.J. Smith[a], I. Strashnov[a], H.H. Stroke[j], D. Verney[f], P.M. Walker[g], K.D.A. Wendt[h], R.T. Wood[g]
Published 12 December 2014

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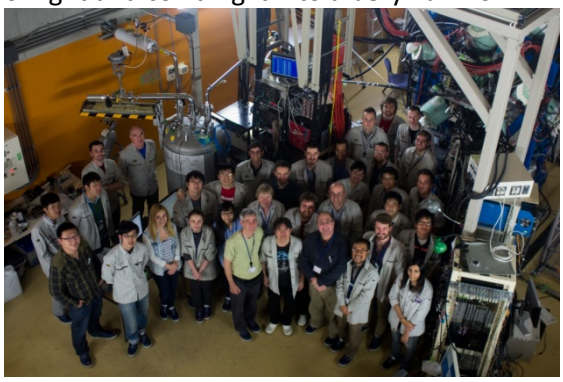
2. News to Report

a. Gamma-ray microscope peers into stellar explosions. Research at the world-leading RIKEN Nishina Centre in Tokyo has revealed nuclear structure details that themselves control elemental abundances from exploding stars. These ground-breaking results have been accepted for publication in Physical Review Letters.
Led by physicists from the Centre for Nuclear and Radiation Physics at the University of

Surrey, from RIKEN, and from Beihang University in Beijing, the research involved accelerating uranium (the heaviest naturally occurring element) to 70 percent of the speed of light and colliding it into a beryllium foil.



Members of the collaboration at RIKEN.

The uranium nuclei fissioned into many different fragments which were separated and identified by a system of magnets and detectors. Fragments with a large excess of neutrons were selected and stopped inside the EURICA "gamma-ray microscope" – a sophisticated array of germanium and lanthanum-bromide gamma-ray detectors. Surrey STFC-funded PhD student, Zena Patel, took the lead in analysing the data for two specific reaction products, samarium-164 and gadolinium-166, expected to be two of the most deformed (rugby-ball shaped) nuclei in nature. The success hinged on the existence of "long lived" nuclear excited states (isomers) predicted to exist in these nuclei. Although the isomers turned out to have lifetimes in the region of only one microsecond, this was sufficient time for them to survive the 100-metre flight path from the beryllium foil to the gamma-ray detector array. They emitted gamma rays after they had stopped in the EURICA array, and the gamma-ray energies demonstrated that indeed they are highly deformed. A key finding is that there are subtle but unexpected deformation differences compared to the better-known isotopes (with fewer neutrons) and it turns out that high-order deformation (β_6) needs to be taken into account. The results provide the first confirmation of a deformed "shell gap" in the nuclear structure predicted by theoretical calculations. This in turn feeds back into calculations that simulate the nuclear reactions inside exploding stars, and predict what elements (and how much of them) should exist in our solar system.
Contribution by Phil Walker
P.Walker@surrey.ac.uk (Surrey)

b. IoP Nuclear Physics Group annual conference 2015. This year the annual conference of the IoP Nuclear Physics Group will be held jointly with the Particle and Astroparticle Physics Groups, and will take place at the University of Manchester from Monday 30th March to Thursday 2nd April. The programme will include talks designed to appeal to all attendees, on topics including

- Nuclear Astrophysics
- Double Beta Decay
- Heavy Ion Physics
- Neutrino interactions
- Dark Matter Searches
- BSM searches at high and low energies
- Higgs at LHC
- Future of Accelerators

as well as invited plenary talks for the individual groups, parallel sessions for which submissions will be invited, and a poster session. There will also be an STFC town meeting.
The first circular will be sent out and registration will go live shortly on the website.
The submission deadline for abstracts is the 15th February.
Contribution by Judith McGovern
judith.mcgovern@manchester.ac.uk
(Manchester)

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3. Outreach Activity

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4. Media Interactions

Radio Show.
11 December 2014, Panel Guest on BBC Radio 4 Quiz Show, 'The Third Degree', Hosted at University of Surrey.
Contribution by Paddy Regan
p.regan@surrey.ac.uk *(NPL/Surrey)*