UK Nuclear Activity

November 2014 Issue 17

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 November

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.

NIM A 763, 210 (2014) http://www.sciencedirect.com/science/article/pii/S0168900214006998
Germanium-gated γ–γ fast timing of excited states in fission fragments using the EXILL&FATIMA spectrometer
J.-M. Régis[a,*], G.S. Simpson[b,c,*], A. Blanc[d], G. de France[e], M. Jentschel[d], U. Köster[d], P. Mutti[d], V. Paziy[f], N. Saed-Samii[a], T. Soldner[d], C.A. Ur[g], W. Urban[d,h], A.M. Bruce[i], F. Drouet[b], L.M. Fraile[f], S. Ilieva[j], J. Jolie[a], W. Korten[k], T. Kröll[j], S. Lalkovski[l], H. Mach[f,m], N. Mărginean[n], G. Pascovici[a], Zs. Podolyak[o], P.H. Regan[o], O.J. Roberts[i], J.F. Smith[c], C. Townsley[o], A. Vancraeyenest[b], N. Warr[a]
Published 1 November 2014

Phys. Rev. C 90, 054901 (2014) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.054901
Multiparticle azimuthal correlations in p-Pb and Pb-Pb collisions at the CERN Large Hadron Collider
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 3 November 2014

Phys. Rev. C 90, 054301 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.054301
Isospin symmetry in the sd shell: Transition strengths in the neutron-deficient sd shell nucleus ^{33}Ar
A. Wendt[1], J. Taprogge[1,2], P. Reiter[1], P. Golubev[3], H. Grawe[4], S. Pietri[4], P. Boutachkov[5], A. Algora[6,7], F. Ameil[4], M. A. Bentley[8], A. Blazhev[1], D. Bloor[8], N. S. Bondili[8], M. Bowry[9], A. Bracco[10], N. Braun[1], F. Camera[10], J. Cederkäll[3], F. Crespi[10], A. de la Salle[11], D. DiJulio[3], P. Doornenbal[12], K. Geibel[1], J. Gellanki[3], J. Gerl[4], J. Grębosz[13], G. Guastalla[5], T. Habermann[4], M. Hackstein[1], R. Hoischen[4], A. Jungclaus[2], E. Merchán[5], B. Million[10], A.

Morales[10], K. Moschner[1], Zs. Podolyák[9], N. Pietralla[5], D. Ralet[5], M. Reese[5], D. Rudolph[3], L. Scruton[8], B. Siebeck[1], N. Warr[1], O. Wieland[10], and H. J. Wollersheim[4]
Published 4 November 2014

PJSIR Series A: Physical Sciences Vol. 57, No. 3, Sep-Oct 2014
http://www.pjsir.org/documents/journals/29102014053544_23102014100210_Binder2adbastarct.pdf
Effect of the Grain Size of the Soil on the Measured Activity and Variation in Activity in Surface and Subsurface Soil Samples
Huda Al-Sulaitiab , Tabassum Nasir, Patrick Henry Regana, David Bradleya, Khulud Al-Mugrenad, Nasser Alkhomashie, Nawras Al-Dahanaf, Muftah Al-Dosarib, Sayed Jamal Bukhari, Marcus Matthewsh, Todsadol Santawamaitrea, Doendara Malaina and Ahmad Habiba
Published 5 November 2014

Phys. Lett. B 738, 223 (2014) http://www.sciencedirect.com/science/article/pii/S0370269314007059
Identification of a millisecond isomeric state in $^{129}Cd_{81}$ via the detection of internal conversion and Compton electrons
J. Taprogge[a,b,c], A. Jungclaus[a,*], H. Grawe[d], S. Nishimura[c], Z.Y. Xu[c], P. Doornenbal[c], G. Lorusso[c], E. Nácher[a], G.S. Simpson[e], P.-A. Söderström[c], T. Sumikama[f], H. Baba[c], F. Browne[h,c], N. Fukuda[c], R. Gernhäuser[i], G. Gey[e,j,c], N. Inabe[c], T. Isobe[c], H.S. Jung[k,1], D. Kameda[c], G.D. Kim[l], Y.-K. Kim[l,m], I. Kojouharov[d], T. Kubo[c], N. Kurz[d], Y.K. Kwon[l], Z. Li[n], H. Sakurai[c,g], H. Schaffner[d], K. Steiger[i], H. Suzuki[c], H. Takeda[c], Zs. Vajta[o,c], H. Watanabe[c], J. Wu[n,c], A. Yagi[p], K. Yoshinaga[q], G. Benzoni[r], S. Bönig[s], K.Y. Chae[t], L. Coraggio[u], A. Covello[v], J.-M. Daugas[w], F. Drouet[e], A. Gadea[x], A. Gargano[u], S. Ilieva[s], F.G. Kondev[y], T. Kröll[s], G.J. Lane[z], A. Montaner-Pizá[x], K. Moschner[aa], D. Mücher[s], F. Naqvi[ab], M. Niikura[g], H. Nishibata[p], A. Odahara[p], R. Orlandi[ac,ad], Z. Patel[ae], Zs. Podolyák[ae], A. Wendt[aa]
Published 10 November 2014

Phys. Lett. B 738, 97-108 (2014) http://www.sciencedirect.com/science/article/pii/S0370269314006765
Beauty production in pp collisions at √s = 2.76 TeV measured via semi-electronic decays
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 10 November 2014

Phys. Lett. B 738, 361-372 (2014) http://www.sciencedirect.com/science/article/pii/S0370269314007242
Suppression of Υ(1S) at forward rapidity in Pb–Pb collisions at √ s_{NN} = 2.76 TeV
B. Abelev et al. ALICE Collaboration, UK Authors: D. Alexandre, L.S. Barnby, D. Evans, 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 November 2014

Phys. Rev. C 90, 051303(R) (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.051303
Spectroscopy on the proton drip-line: Probing the structure dependence of isospin nonconserving interactions
J. Henderson[1], D. G. Jenkins[1], K. Kaneko[2], P. Ruotsalainen[3], P. Sarriguren[4], K. Auranen[3], M. A. Bentley[1], P. J. Davies[1], A. Görgen[5], T. Grahn[3], P. T. Greenlees[3], A. Hay[1], T. W. Henry[1], A. Herzáň[3], U. Jakobsson[3], R. Julin[3], S. Juutinen[3], J. Konki[3], M. Leino[3], C. McPeake[6], S. Milne[1], A. J. Nichols[1], J. Pakarinen[3], P. Papadakis[3], J. Partanen[3], P. Peura[3], P. Rahkila[3], E. Sahin[5], M. Sandzelius[3], J. Sarén[3], C. Scholey[3], M. Siciliano[3,7], L. Sinclair[1], J. Sorri[3], S. Stolze[3], J. Uusitalo[3], R. Wadsworth[1], and M. Zielińska[8]
Published 18 November 2014

Phys. Rev. C 90, 054322 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.054322
Correlated density-dependent chiral forces for infinite-matter calculations within the Green's function approach
Arianna Carbone[1,*], Arnau Rios[2,†], and Artur Polls[1,‡]
Published 18 November 2014

Phys. Rev. C 90, 054327 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.054327
Isovector properties of the Gogny interaction
Roshan Sellahewa and Arnau Rios
Published 19 November 2014

Phys. Rev. C 90, 054324 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.054324
Resonances in ^{14}C observed in the ^{4}He(^{10}Be,α)^{10}Be reaction
M. Freer[1], J. D. Malcolm[1], N. L. Achouri[2], N. I. Ashwood[1], D. W. Bardayan[3,*], S. M. Brown[4], W. N. Catford[4], K. A. Chipps[3], J. Cizewski[5], N. Curtis[1], K. L. Jones[6], T. Munoz-Britton[1], S. D. Pain[3], N. Soić[7], C. Wheldon[1], G. L. Wilson[4,†], and V. A. Ziman[1]
Published 19 November 2014

Phys. Rev. C 90, 054331 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.054331
Spectroscopy of ^{161}Hf from low to high spin
P. J. R. Mason[1], J. Simpson[1,*], E. S. Paul[2], M. A. Riley[3], K. Auranen[4], H. Badran[4], J. S. Baron[3], A. J. Boston[2], T. Davis-Merry[2], T. Grahn[4], P. T. Greenlees[4], A. Herzáň[4], U. Jakobsson[4], D. T. Joss[2], R. Julin[4], S. Juutinen[4], J. Konki[4], M. Leino[4], C. McPeake[2], S. L. Miller[3], G. O'Neill[2], J. Pakarinen[4], P. Papadakis[4], J. Partanen[4], P. Peura[4], P. Rahkila[4], P. Ruotsalainen[4], M. Sandzelius[4], J. Sarén[4], C. Scholey[4], J. F. Sharpey-Schafer[5], L. Sinclair[6], J. Sorri[4], S. Stolze[4], J. Uusitalo[4], K. Villafani[3], F. Wearing[2], and J. P. Wright[2]
Published 21 November 2014

Phys. Rev. C 90, 057602 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.90.057602
Systematics of intermediate-energy single-nucleon removal cross sections
J. A. Tostevin[1,2] and A. Gade[2,3]
Published 26 November 2014

Eur. Phys. J. A 50, 179 (2014) http://link.springer.com/article/10.1140/epja/i2014-14179-5
A new study of the ^{22}Ne(p, γ)^{23}Na reaction deep underground: Feasibility, setup and first observation of the 186 keV resonance
F. Cavanna, R. Depalo, M. -L. Menzel, M. Aliotta, M. Anders, D. Bemmerer, C. Broggini, C. G. Bruno, A. Caciolli, P. Corvisiero, T. Davinson, A. di Leva, Z. Elekes, F. Ferraro, A. Formicola, Zs. Fülöp, G. Gervino, A. Guglielmetti, C. Gustavino, Gy. Gyürky, G. Imbriani, M. Junker, R. Menegazzo, P. Prati, C. Rossi Alvarez, D. A. Scott, E. Somorjai, O. Straniero, F. Strieder, T. Szücs, D. Trezzi, LUNA Collaboration
Published November 2014

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2. News to Report

a. Nuclear Data: Current Measurements, Uncertainties, Applications and Needs. On the 30th October 2014 the National Physical Laboratory (NPL) hosted a one day workshop to discuss the present status and future requirements of nuclear data. The event was jointly sponsored by the IOP nuclear physics and nuclear industry groups, and the National Nuclear Laboratory (NNL). The agenda and a selection of the presentations can be found on the NPL website here. The speakers included representatives from national and international laboratories, the nuclear industry and academia.
The packed schedule included: talks covering the national and international projects for nuclear data and the UK's role within these efforts; some examples of specific nuclear data requirements from industry; and the interests of UK academics, highlighting overlaps with nuclear data. The event was attended by around 100 people from the nuclear physics community and a range of different industries. The workshop was very successful, generating positive feedback and promoting lively discussions during the lunch break and at the end of the day.

Contribution by Elizabeth Cunningham
Elizabeth.Cunningham@stfc.ac.uk
(STFC/Surrey)

b. Nuclear Science and Society at Notre Dame. Nuclear physics is a cornucopia from whence flows a seemingly never-ending stream of applications in healthcare, energy, security, archaeology, art and forensics. Two of these topics, energy and healthcare, were the focus of a workshop entitled "Nuclear Science and Society" organised by Umesh Garg, Ani Aprahamian and Michael Wiescher from the University of Notre Dame from 27-

29 October at the Notre Dame Centre in London.

There have been operating accelerators at Notre Dame since 1937 and in recent times the University has been an important centre for studies of nuclear astrophysics, making excellent use of the FN Tandem Van de Graaff and the 5MV NEC accelerators on Campus. They have now embarked on a major extension of their work to applied nuclear physics with a significant increase in academic staff and two new accelerators. It seems a sound policy given that applications flourish when the protagonists live cheek by jowl with those pursuing basic science.

The workshop is one of the fruits of this policy. Testimony to its success were the lively discussions throughout the meeting. It began with some talks of broad scope. The chair of NuPECC, Angela Bracco (Milan), gave a succinct summary of the recent NuPECC report on the large effort devoted in Europe to Nuclear Physics in Medicine. Martin Freer (Birmingham) gave an upbeat account of the U.K.'s belated attempts to create a new fleet of nuclear reactors. Worries about the reduced numbers of people with relevant skills in the U.K, the possibility of having a slew of different reactor designs rather than a standardised fleet and the question of whether the U.K. puts enough effort into acquiring nuclear data and supporting nuclear databases all arose in the discussions. This was followed by Wolfgang Bauer (Michigan State) on the question of whether Thorium should be the preferred fuel for future reactors. Giovanni Battisoni (Milan) then brought us up to date with hadron therapy, a topic of current interest in the U.K. since we have belatedly grasped the nettle with UCL and the Christie in Manchester being the chosen sites for two proton therapy machines. Later in the meeting Karen Kirkby (Surrey) shed more light on the radiobiology needed to underpin the use of these machines.

The U.K. nuclear groups provided a significant number of speakers. Andy Boston (Liverpool) enlightened us about how work on AGATA has been put to good use in a variety of situations both in healthcare and security. Paul Nolan told us about some of Liverpool's well established work in low background gamma-ray counting applied to such topics as how sediments are deposited in lakes. Paddy Regan (Surrey) told us a bit more on the same general theme with the emphasis here on using natural background surveys in places like Thailand and Qatar, where the results will provide a baseline for any future changes due to natural or man-made causes. A good example being the devastating tsunami in Thailand in 2004. David Ireland told us about Glasgow's efforts, together with the National Nuclear Laboratory, to use muon scattering to look for pieces of heavy metals in low-level waste drums. This has moved on from his talk at last year's UK meeting on applied nuclear physics at the IOP, to the point where a full scale device is in preparation. David Jenkins (York) brought us up to date with attempts to characterise and make full use of the new scintillators and associated solid state photomultipliers that have come on the market and are likely to have an increasing number of applications in future. Steven Judge (NPL) talked about NPL's mission and the need for nuclear data. The community of nuclear physicists provide a considerable service in that many things we measure provide the foundation of the nuclear databases needed by the nuclear industry, astronomers, applications in healthcare and much more. Primary nuclear standards are just as important in nuclear physics as in many other areas of physical sciences.

Support for them is not what it should be in the U.K., mainly because of the balkanisation of the nuclear industry started in the 1960s.

One real highlight of the meeting was the talk by Walter Kutschera (Vienna) on the application of AMS to a wide variety of topics. He touched on an amazing range of interesting topics in a single talk and showed us how nuclear weapons tests, despite being a stain on human conscience, are extremely useful in terms of dating. He also showed us how much has been learned about the end of the last ice age by studies of Otzi, the iceman, and the materials found near where his body was found.

Lack of space forbids mention of every talk. Perhaps the most important point to make is how vibrant the application of nuclear physics is and how much more we can expect. The Notre Dame organisers saw this as the first of an annual series and the next will be at the Notre Dame centre in Rome in one year and we can expect to hear about an even greater range of topics then.

Contribution by Bill Gelletly
w.gelletly@surrey.ac.uk *(Surrey)*

c. Boost for Nuclear Theory in the UK. The University of York Physics Department is delighted to have entered into a strategic partnership with STFC to create a new group in low-energy nuclear physics theory. The purpose of this new initiative is to enhance and extend the UK's expertise in nuclear theory. It is expected that the new theory group will provide strong input to both York's own existing experimental programme in nuclear structure and reaction physics as well as the programmes being performed by other UK based nuclear physics groups.
The initial funding from STFC will provide for the appointment of a Chair in low-energy nuclear theory for approximately three-and-a-half years, after which time the university will fund the position. The appointment of a chair will be followed immediately by the advertisement for a lecturer in low-energy nuclear theory, to be funded by the University of York. The advertisement for the new chair is currently out and it is hoped that the person appointed will take up the position around March 2015. It is expected that the new lecturer will be in post by June 2015.
STFC have also provided some travel funds, which can be used in part to assist with travel for the theory community within the UK during initial efforts to forge strong links between the new group at York and existing theory groups.
Contribution by Bob Wadsworth rw10@npg.york.ac.uk (York)

d. STFC/POST Parliamentary Fellowship Scheme 2015. An opportunity is available for an STFC-funded PhD student to undertake a three month secondment to the Parliamentary Office of Science and Technology (POST). Working in Westminster, the scheme enables the successful applicant to assist POST with their busy research workload and gain valuable insight into the work of Parliament and the policy making process.
POST is Parliament's in-house source of independent, balanced and accessible analysis of public policy issues related to science and technology.
Under the STFC/POST Fellowship Scheme, STFC-funded PhD students are given the opportunity to spend three months working in Parliament with POST. The successful applicant will have the opportunity to work on one of the following projects:
- Produce a 'POSTnote' briefing document (previous examples can be found at http://www.parliament.uk/mps-lords-and-offices/offices/bicameral/post/publications/postnotes)
- Contribute to a longer report
- Assist a select committee in a current inquiry
- Assist science and environment specialists with research in the House of Commons library.

The fellowship presents a valuable opportunity for PhD students to gain experience working at the heart of the UK policy making. PhD students with an interest in science policy, communications or wishing to gain experience outside the academic sector should consider applying.
For more information, case studies and application details, please visit http://www.stfc.ac.uk/stfc-post.
Deadline Tuesday 23 December 2014.

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3. Outreach Activity

Physics Lectures.
23 October 2014: 'Nuclear Physics Research at the University of Surrey'. Department Colloquium, Department of Nuclear Engineering, North Carolina State University, Raleigh, North Carolina, USA.
27-29 October 2014: 'Applications of Gamma Spectrometry for NORM and Radioactive Tracer Studies'. Invited talk, Notre Dame-Europe Symposium on Nuclear Science and Society, London.
20 November 2014: 'Fukushima three years on? Measurement and identification of radioactive materials in the environment'. Talk at the Cranleigh Rotary Club, Cranleigh, Surrey.
21 November 2014: 'Nuclear Spectroscopy: From Natural Radioactivity to Studies of the Most Exotic Isotopes'. Departmental Colloquium, Queen Mary University of London.
Contribution by Paddy Regan p.regan@surrey.ac.uk (NPL/Surrey)

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4. Media Interactions
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