UK Nuclear Activity

November 2016 Issue 41

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.

EPJ Web of Conferences 123, 01006 (2016) http://dx.doi.org/10.1051/epjconf/201612301006
Evolution of collective structures in the heavy transitional nuclei above the N = 82 closed shell
D. T. Joss
*Published 5 September 2016

J. High Energy Phys. 09 (2016) 164 http://link.springer.com/article/10.1007/JHEP09%282016%29164
Higher harmonic flow coefficients of identified hadrons in Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV
ALICE Collaboration, UK Authors: D. Alexandre, H. A. Andrews, L.S. Barnby, M. Borri, M. Chartier, D. Evans, K.L. Graham, P.G. Jones, A. Jusko, M. Krivda, R. C. Lemmon, R. Lietava, J. Norman, O. Villalobos Baillie, N. Zardoshti
*Published 28 September 2016

Phys. Rev. C 94, 044327 (2016) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.044327
Excited states and reduced transition probabilities in ^{168}Os
T. Grahn[1,2,*], S. Stolze[2], D. T. Joss[1], R. D. Page[1], B. Saygı[1,†], D. O'Donnell[1], M. Akmali[1], K. Andgren[3], L. Bianco[1], D. M. Cullen[4], A. Dewald[5], P. T. Greenlees[2], K. Heyde[6], H. Iwasaki[5], U. Jakobsson[2], P. Jones[2], D. S. Judson[1], R. Julin[2], S. Juutinen[2], S. Ketelhut[2], M. Leino[2], N. Lumley[4], P. J. R. Mason[4,7], O. Möller[8], K. Nomura[5,9], M. Nyman[2], A. Petts[1], P. Peura[2], N. Pietralla[8], Th. Pissulla[5], P. Rahkila[2], P. J. Sapple[1], J. Sarén[2], C. Scholey[2], J. Simpson[7], J. Sorri[2], P. D. Stevenson[10], J. Uusitalo[2], H. V. Watkins[1], and J. L. Wood[11]
*Published 28 October 2016

*Also including missed publications from previous months.

Phys. Rev. Lett. 117, 182301 (2016) https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.117.182301
Correlated Event-by-Event Fluctuations of Flow Harmonics in Pb-Pb Collisions at $\sqrt{s_{NN}}$ = 2.76 TeV
ALICE Collaboration, UK Authors: D. Alexandre, L.S. Barnby, M. Borri, M. Chartier, D. Evans, M.A.S. Figueredo, K.L. Graham, P.G. Jones, A. Jusko, M. Krivda, G. R. Lee, R.C. Lemmon, R. Lietava, J. Norman, O. Villalobos Baillie, N. Zardoshti
*Published 28 October 2016

Phys. Rev. C 94, 054304 (2016) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.054304
Experimental study of high-lying states in ^{28}Mg using the resonant elastic scattering of α particles
J. Walshe[1,*], M. Freer[1], C. Wheldon[1], A. Soylu[2], N. L. Achouri[3], N. I. Ashwood[1], W. N. Catford[4], I. C. Celik[4], N. Curtis[1], F. Delaunay[5], B. Fernández-Domínguez[6], L. Grassi[7], Tz. Kokalova[1], F. M. Marqués[5], N. A. Orr[5], L. Prepolec[7], V. Scuderi[8], N. Soić[7], and V. Tokić[7]
Published 4 November 2016

Phys. Rev. C 94, 054305 (2016) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.054305
Laser and decay spectroscopy of the short-lived isotope Fr214 in the vicinity of the N=126 shell closure
G. J. Farooq-Smith[1,2,*], T. E. Cocolios[1,2], J. Billowes[1], M. L. Bissell[1,2], I. Budinčević[2], T. Day Goodacre[1,3], R. P. de Groote[2], V. N. Fedosseev[3], K. T. Flanagan[1], S. Franchoo[4], R. F. Garcia Ruiz[1,2], H. Heylen[2], R. Li[4,†], K. M. Lynch[2,5], B. A. Marsh[3], G. Neyens[2], R. E. Rossel[3,6], S. Rothe[1,3], H. H. Stroke[7], K. D. A. Wendt[6], S. G. Wilkins[1], and X. F. Yang[2]
Published 4 November 2016

Phys. Lett. B 762, 237 (2016) http://www.sciencedirect.com/science/article/pii/S0370269316305251
Isomerism in the "south-east" of ^{132}Sn and a predicted neutron-decaying isomer in ^{129}Pd
Cenxi Yuan[a,,], Zhong Liu[b,,], Furong Xu[c,d], P.M. Walker[e], Zs. Podolyák[e], C. Xu[f], Z.Z. Ren[f], B. Ding[b], M.L. Liu[b], X.Y. Liu[b], H.S. Xu[b], Y.H. Zhang[b], X.H. Zhou[b], W. Zuo[b]
Published 10 November 2016

Physics Letters B 762, 376 (2016) http://www.sciencedirect.com/science/article/pii/S0370269316303586
Pseudorapidity dependence of the anisotropic flow of charged particles in Pb–Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV
ALICE Collaboration, UK Authors: D. Alexandre, L.S. Barnby, M. Borri, M. Chartier, D. Evans, M.A.S. Figueredo, K.L. Graham, P.G. Jones, A. Jusko, M. Krivda, R.C. Lemmon, R. Lietava, J. Norman, O. Villalobos Baillie, N. Zardoshti
Published 10 November 2016

Phys. Lett. B 762, 404 (2016) http://www.sciencedirect.com/science/article/pii/S0370269316305639
K-mixing in the doubly mid-shell nuclide ^{170}Dy and the role of vibrational degeneracy
P.-A. Söderström[a,,], P.M. Walker[b], J. Wu[a,c], H.L. Liu[d], P.H. Regan[b,e], H. Watanabe[f,g], P. Doornenbal[a], Z. Korkulu[h,1], P. Lee[i], J.J. Liu[j], G. Lorusso[a,e], S. Nishimura[a], V.H. Phong[a,k], T. Sumikama[l,1], F.R. Xu[c], A. Yagi[m], G.X. Zhang[g], D.S. Ahn[a], T. Alharbi[n], H. Baba[a], F. Browne[o], A.M. Bruce[o], R.J. Carroll[b], K.Y. Chae[p], Zs. Dombradi[h], A. Estrade[q,2], N. Fukuda[a], C.J. Griffin[q], E. Ideguchi[m,r], N. Inabe[a], T. Isobe[a], H. Kanaoka[m], S. Kanaya[m], I. Kojouharov[s], F.G. Kondev[t], T. Kubo[a], S. Kubono[a], N. Kurz[s], I. Kuti[h], S. Lalkovski[b], G.J. Lane[u], E.J. Lee[p], C.S. Lee[i], G. Lotay[b], C.-B. Moon[v], I. Nishizuka[l,3], C.R. Niţă[o,w], A. Odahara[m], Z. Patel[b], Zs. Podolyák[b], O.J. Roberts[x], H. Sakurai[a,y], H. Schaffner[s], C.M. Shand[b], H. Suzuki[a], H. Takeda[a], S. Terashima[g], Zs. Vajta[h], J.J. Valiente-Dòbon[z], Z.Y. Xu[j,4]
Published 10 November 2016

Phys. Lett. B 762, 455 (2016) http://www.sciencedirect.com/science/article/pii/S0370269316305561
Search for an isospin *I* = 3 dibaryon
The WASA-at-COSY Collaboration P. Adlarson[a,1], W. Augustyniak[b], W. Bardan[c], M. Bashkanov[d,,], F.S. Bergmann[e], M. Berłowski[f], H. Bhatt[g], A. Bondar[h,i], M. Büscher[l,2,3], H. Calén[a], I. Ciepał[c], H. Clement[j,k], E. Czerwiński[c], K. Demmich[e], R. Engels[l], A. Erven[m], W. Erven[m], W. Eyrich[n], P. Fedorets[l,o], K. Föhl[p], K. Fransson[a], F. Goldenbaum[l], A. Goswami[l,q], K. Grigoryev[l,r,4], C.-O. Gullström[a], L. Heijkenskjöld[a], V. Hejny[l,1], N. Hüsken[e], L. Jarczyk[c], T. Johansson[a], B. Kamys[c], G. Kemmerling[m,5], F.A. Khan[l], G. Khatri[c], A. Khoukaz[e], O. Khreptak[c], D.A. Kirillov[s], S. Kistryn[c], H. Kleines[m,5], B. Kłos[t], W. Krzemień[c], P. Kulessa[u], A. Kupść[a,f], A. Kuzmin[h,i], K. Lalwani[v], D. Lersch[l], B. Lorentz[l], A. Magiera[c], R. Maier[l,w,x], P. Marciniewski[a], B. Mariański[b], H.-P. Morsch[b], P. Moskal[c], H. Ohm[l], E. Perez del Rio[j,k,6], N.M. Piskunov[s], D. Prasuhn[l], D. Pszczel[a,f], K. Pysz[u], A. Pyszniak[a,c], J. Ritman[l,w,x,y], A. Roy[q], Z. Rudy[c], O. Rundel[c], S. Sawant[g,l], S. Schadmand[l], I. Schätti-Ozerianska[c], T. Sefzick[l], V. Serdyuk[l], B. Shwartz[h,i], K. Sitterberg[e], T. Skorodko[j,k,z], M. Skurzok[c], J. Smyrski[c], V. Sopov[o], R. Stassen[l], J. Stepaniak[f], E. Stephan[t], G. Sterzenbach[l], H. Stockhorst[l], H. Ströher[l,w,x], A. Szczurek[u], A. Trzciński[b], R. Varma[g], M. Wolke[a], A.

Wrońska[c], P. Wüstner[m], A. Yamamoto[aa], J. Zabierowski[ab], M.J. Zieliński[c], A. Zink[n], J. Złomańczuk[a], P. Żuprański[b], M. Żurek[l]
Published 10 November 2016

Phys. Rev. C 94, 054311 (2016) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.054311
Spectroscopy of ^{70}Kr and isospin symmetry in the T=1 fpg shell nuclei
D. M. Debenham, P. Ruotsalainen, J. Henderson, M. A. Bentley, P. J. Davies, T. Haylett, D. G. Jenkins, P. Joshi, L. F. Sinclair, K. Kaneko, K. Auranen, H. Badran, T. Grahn, P. Greenlees, A. Herzáň, U. Jakobsson, J. Konki, R. Julin, S. Juutinen, M. Leino, J. Sorri, J. Pakarinen, P. Papadakis, P. Peura, J. Partanen, P. Rahkila, M. Sandzelius, J. Sarén, C. Scholey, S. Stolze, J. Uusitalo, H. M. David, G. de Angelis, W. Korten, G. Lotay, M. Mallaburn, E. Sahin, R. Wadsworth
Published 14 November 2016

Phys. Rev. C 94, 054314 (2016) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.054314
Rearrangement of valence neutrons in the neutrinoless double-β decay of ^{136}Xe
S. V. Szwec[1], B. P. Kay[2,*], T. E. Cocolios[1,†], J. P. Entwisle[1], S. J. Freeman[1], L. P. Gaffney[3], V. Guimarães[4], F. Hammache[5], P. P. McKee[3], E. Parr[3], C. Portail[5], J. P. Schiffer[2], N. de Séréville[5], D. K. Sharp[1], J. F. Smith[3], and I. Stefan[5]
Published 15 November 2016

Phys. Rev. Lett. 117, 222302 (2016) http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.117.222302
Role of the Δ Resonance in the Population of a Four-Nucleon State in the ^{56}Fe→^{54}Fe Reaction at Relativistic Energies
Zs. Podolyák[1], C. M. Shand[1], N. Lalović[2,3], J. Gerl[3], D. Rudolph[2], T. Alexander[1], P. Boutachkov[3], M. L. Cortés[3,4], M. Górska[3], I. Kojouharov[3], N. Kurz[3], C. Louchart[4], E. Merchán[4], C. Michelagnoli[5], R. M. Pérez-Vidal[6], S. Pietri[3], D. Ralet[4,3], M. Reese[4], H. Schaffner[3], Ch. Stahl[4], H. Weick[3], F. Ameil[3], G. de Angelis[7], T. Arici[3,8], R. Carroll[1], Zs. Dombrádi[9], A. Gadea[6], P. Golubev[2], M. Lettmann[4], C. Lizarazo[4,3], D. Mahboub[10], H. Pai[4], Z. Patel[1], N. Pietralla[4], P. H. Regan[1], L. G. Sarmiento[2], O. Wieland[11], E. Wilson[1], B. Birkenbach[12], B. Bruyneel[13], I. Burrows[14], L. Charles[15], E. Clément[5], F. C. L. Crespi[16,11], D. M. Cullen[17], P. Désesquelles[18], J. Eberth[12], V. González[19], T. Habermann[4,3], L. Harkness-Brennan[20], H. Hess[12], D. S. Judson[20], A. Jungclaus[21], W. Korten[13], M. Labiche[14], A. Maj[22], D. Mengoni[23,24], D. R. Napoli[7], A. Pullia[16,11], B. Quintana[25], G. Rainovski[26], P. Reiter[12], M. D. Salsac[13], E. Sanchis[19], and J. J. Valiente Dóbon[7]
Published 23 November 2016

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2. News to Report

a. New ISOLDE Group Leader

The 77th ISCC meeting was held at CERN on the 2nd of November, with Daniel Doherty (Surrey) standing in for David Jenkins (York) as the UK representative. During the meeting Prof. Gerda Neyens from KU Leuven was elected as the next ISOLDE group leader, taking over from Maria Borge in June 2017. We would like to take this opportunity to wish Gerda all the very best in her new position.
Contribution by Daniel Doherty d.t.doherty@surrey.ac.uk (Surrey) and David Jenkins david.jenkins@york.ac.uk (York)

b. Just reward - University of Glasgow Nuclear Physics outreach team awarded Hunter-Cummings Prize

Hot on the heels of their very successful outing at the sell-out Explorathon during the European Researchers Night held at Glasgow's Science Centre where they showcased applications of nuclear physics, the outreach team of the University of Glasgow's nuclear physics group (Natalia Campos Rivera, Richard Gray, Abby-Rhian Powell and Frank Thomson) were awarded one of the most prestigious prizes, the Hunter Cummings Prize, by the School of Physics and Astronomy. This prize is annually awarded to the students who during their postgraduate studies make the most significant contribution to the school's outreach activities. Given the school's excellent outreach record in many research fields, being awarded this prize is a fantastic achievement, a just reward for past efforts and a very strong incentive for further efforts.
Contribution by Bjorn Seitz Bjoern.Seitz@glasgow.ac.uk (Glasgow)

c. Finalist in IoP Early Career Physics Communicator Award 2016

On 21st November Chantal Nobs was invited to the IoP Physics Communicators Group – Early Career Physics Communicator Award 2016 event, having been selected as one of four finalists.

Over the last four years Chantal has designed, developed and run a number of public engagement events including children's birthday parties, hands-on workshops explaining the electromagnetic spectrum and explaining her research to passers-by at Soapbox Science on London's Southbank. She believes that the best way to encourage students to continue studying physics at A-level and beyond is to spark their interest from an early age. Over the coming year, Chantal plans to develop new workshops aimed at primary school students to achieve exactly this. To find out more about Chantal's outreach activities visit her website: www.physicsfundamentals.org

Contribution by Chantal Nobs
c.nobs@brighton.ac.uk (Brighton)

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3. Outreach Activity

Outreach Talk

Phil Walker gave an evening talk to the Cambridge University Physics Society on 26th October entitled: "Nuclear isomers: castles in the sky". The audience of ~35 people was mainly undergraduates.

Contribution by Phil Walker
p.walker@surrey.ac.uk (Surrey)

Teach the Teachers Workshop @RAL.

On the 14th November the STFC Rutherford Appleton Laboratory (RAL) hosted a nuclear physics teacher training event for seven teachers. This programme of workshops was started by David Jenkins (York) when he was a STFC public engagement fellow and is continued by him and John Roberts (Manchester) supported by the Nuclear Institute. The aim of these events is to give secondary school teachers a greater understanding of curriculum linked topics in nuclear physics to increase their confidence when teaching these subjects in the classroom.

The one day workshop consisted of a combination of lectures by UK nuclear physicists, a tour of the ISIS accelerator facility and hands on activities. John Roberts spoke about nuclear energy, while David Jenkins gave his 'nuclear physics at CERN talk'. Elizabeth Cunningham (STFC/Surrey) ran a Rutherford scattering workshop designed to help teach this part of the curriculum at GCSE level.

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

Hull training event, new collaborators and further Binding Blocks news

On the 9th of November, Binding Blocks held a training event for staff and students at the University of Hull.

The purpose of the Binding Blocks chart is to explain nuclear phenomena to the general public and schools, for all age ranges and anyone with an enthusiasm for LEGO. On the chart, black blocks represent stable nuclei, yellow alpha decay, red beta+ decay, orange proton decay, light blue beta- decay and dark blue neutron decay. The height represents the available energy per kg material (in units of 25TJ/kg). This project revolves around building a full 8m, ~27000 brick chart of the nuclides, and two smaller portions can be built up to Yttrium (our Iron+ chart) and up to Neon (our Neon chart), depending on the event.

The Binding Blocks team organised an event at the University of Hull for any physics staff and students to attend in order to be trained on the project. The Iron+ chart was built, with talks given to those attending. The talks ranged from a description of the project and the chart through to medical physics.

The event was received very well and now the University of Hull have become a new collaborator on the project. They are enthusiastic enough that they wish to know more details about the project so they can

purchase their own LEGO and display their own chart!
The Binding Blocks team are organising several events for after the Christmas holidays. These include a multi-school event for A-Level students within the York area; seeing if the chart can attend a Stargazing Live event at St Peters School in York in January and also a teachers event in collaboration with the NSLC at York.

Check out our website: http://www.york.ac.uk/physics/public-and-schools/schools/secondary/binding-blocks/ as well as our own YouTube channel: https://www.youtube.com/channel/UCvIXlFgJyGh4Jle_4_KE2aA, Twitter account: https://twitter.com/BindingBlocks and Facebook page: https://www.facebook.com/bindingblocks/

Contribution by Thomas Sanders
tjs529@york.ac.uk (York)

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4. Media Interactions

Marialuisa Aliotta (Edinburgh) appeared on the TV program - ITV Border Life on the 14th November. This episodes paid tribute to the scientific contributions of Mary Somerville, whose image will soon appear on a new £10 banknote to be issued by the Royal Bank of Scotland early next year.

http://www.itv.com/news/border/update/2016-11-14/watch-border-life-online/

Contribution by Marialuisa Aliotta
maliotta@staffmail.ed.ac.uk (Edinburgh)