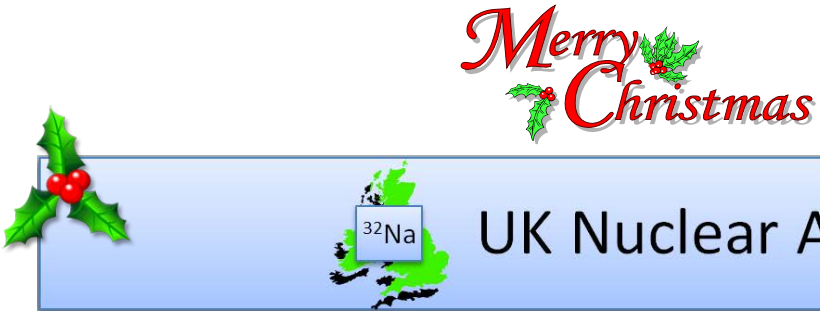


December 2013 Issue 6

In this issue,

1. Nuclear Physics Publications for December

2. News to report
   a. Radiometric Statistics course for Sellafield.
   b. Top 10 physics breakthroughs for 2013 announced.

3. Outreach Activity

4. Media Interactions

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

---

***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.

Phys. Rev. C 88, 045801 (2013) http://prc.aps.org/abstract/PRC/v88/i4/e045801
Constraining nova observables: Direct measurements of resonance strengths in $^{33}$S(p,γ )$^{34}$Cl
J. Fallis[1,*], A. Parikh[2,3,4], P. F. Bertone[5], S. Bishop[4], L. Buchmann[1], A. A. Chen[6], G. Christian[1], J. A. Clark[5], J. M. D'Auria[7], B. Davids[1,7], C. M. Deibel[5,8,9], B. R. Fulton[10], U. Greife[11], B. Guo[12], U. Hager[1,11], C. Herlitzius[4], D. A. Hutcheon[1], J. José[2,3], A. M. Laird[10], E. T. Li[12], Z. H. Li[12], G. Lian[12], W. P. Liu[12], L. Martin[1], K. Nelson[1,6], D. Ottewell[1], P. D. Parker[13], S. Reeve[1,7], A. Rojas[1], C. Ruiz[1], K. Setoodehnia[6], S. Sjue[1], C. Vockenhuber[14], Y. B. Wang[12], and C. Wrede[15,16]
*Published 18 October 2013

Phys. Rev. C 88, 054326 (2013) http://prc.aps.org/abstract/PRC/v88/i5/e054326
Self-consistent Green's functions formalism with three-body interactions
Arianna Carbone[1], Andrea Cipollone[2], Carlo Barbieri[2], Arnau Rios[2], and Artur Polls[1]
*Published 27 November 2013

Eur. Phys. J. C (2013) 73:2662 http://link.springer.com/article/10.1140/epjc/s10052-013-2662-9
Energy dependence of the transverse momentum distributions of charged particles in pp collisions measured by ALICE
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, A. Palaha, P. Petrov, R. Romita, P.A. Scott, O. Villalobos-Baillie
Published 5 December 2013

*Also including missed publications from previous months.

Edited by Elizabeth Cunningham, STFC Particle and Nuclear Physics Outreach Officer.
Elizabeth.Cunningham@stfc.ac.uk or E.Cunningham@surrey.ac.uk

Phys. Rev. C 88, 062802(R) (2013) http://prc.aps.org/abstract/PRC/v88/i6/e062802
Search for new resonant states in $^{10}$C and $^{11}$C and their impact on the cosmological lithium problem
F. Hammache[1,*], A. Coc[2], N. de Séréville[1], I. Stefan[1], P. Roussel[1], S. Ancelin[1], M. Assié[1], L. Audouin[1], D. Beaumel[1], S. Franchoo[1], B. Fernandez-Dominguez[3], S. Fox[4], C. Hamadache[2], J. Kiener[2], A. Laird[4], B. Le Crom[1], A. Lefebvre-Schuhl[2], L. Lefebvre[1], I. Matea[1], A. Matta[1,†], G. Mavilla[1], J. Mrazek[5], P. Morfouace[1], F. de Oliveira Santos[6], A. Parikh[7], L. Perrot[1], A. M. Sanchez-Benitez[8,‡], D. Suzuki[1], V. Tatischeff[2], P. Ujic[6,§], and M. Vandebrouck[1]
Published 6 December 2013

Phys. Rev. C 88, 064308 (2013) http://prc.aps.org/abstract/PRC/v88/i6/e064308
Dipole response of $^{76}$Se above 4 MeV
P. M. Goddard[1,2], N. Cooper[2], V. Werner[2], G. Rusev[3,4,*], P. D. Stevenson[1], A. Rios[1], C. Bernards[2], A. Chakraborty[5], B. P. Crider[5], J. Glorius[6], R. S. Ilieva[1,2], J. H. Kelley[4,7], E. Kwan[3,4,†], E. E. Peters[5], N. Pietralla[6], R. Raut[3,4,‡], C. Romig[6], D. Savran[8,9], L. Schnorrenberger[6], M. K. Smith[2], K. Sonnabend[6,10], A. P. Tonchev[3,4,§], W. Tornow[3,4], and S. W. Yates[5]
Published 6 December 2013

Phys. Rev. C 88, 064309 (2013) http://prc.aps.org/abstract/PRC/v88/i6/e064309
Investigation of the 4-α linear chain state in $^{16}$O
N. Curtis[1,*], S. Almaraz-Calderon[2], A. Aprahamian[2], N. I. Ashwood[1], M. Barr[1], B. Bucher[2], P. Copp[3], M. Couder[2], X. Fang[2], M. Freer[1], G. Goldring[4], F. Jung[2], S. R. Lesher[3], W. Lu[2], J. D. Malcolm[1], A. Roberts[2], W. P. Tan[2], C. Wheldon[1], and V. A. Ziman[1]
Published 6 December 2013

Phys. Rev. Lett. 111, 232302 (2013) http://prl.aps.org/abstract/PRL/v111/i23/e232302
Directed Flow of Charged Particles at Midrapidity Relative to the Spectator Plane 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, L.D. Hanratty, P.G. Jones, A. Jusko, M. Krivda, G.R. Lee, R.C. Lemmon, R. Lietava, A. Palaha, P. Petrov, R. Romita, P.A. Scott, O. Villalobos-Baillie
Published 6 December 2013

Phys. Rev. C 88, 064608 (2013) http://prc.aps.org/abstract/PRC/v88/i6/e064608
Separable representation of phenomenological optical potentials of Woods-Saxon type
L. Hlophe[1,*], Ch. Elster[1,†], R. C. Johnson[2], N. J. Upadhyay[3], F. M. Nunes[3], G. Arbanas[4], V. Eremenko[1,6], J. E. Escher[5], I. J. Thompson[5], and (TORUS Collaboration)
Published 11 December 2013

NIM B 317 B, 417 (2013) http://www.sciencedirect.com/science/article/pii/S0168583X13007180
First application of the Laser Ion Source and Trap (LIST) for on-line experiments at ISOLDE
D.A. Fink[a,b,c], S.D. Richter[d], B. Bastin[e], K. Blaum[b], R. Catherall[a], T.E. Cocolios[a,f], D.V. Fedorov[g], V.N. Fedosseev[a], K.T. Flanagan[f], L. Ghys[h,i], A. Gottberg[a,j], N. Imai[k], T. Kron[d], N. Lecesne[e], K.M. Lynch[a,f], B.A. Marsh[a], T.M. Mendonca[a,l], D. Pauwels[h], E. Rapisarda[a], J.P. Ramos[a,m], R.E. Rossel[a,d], S. Rothe[a,d], M.D. Seliverstov[g,n], M. Sjödin[e], T. Stora[a], C. Van Beveren[h], K.D.A. Wendt[d]
Published 15 December 2013

NIM B 317 B, 492 (2013) http://www.sciencedirect.com/science/article/pii/S0168583X13009014
Recent exploits of the ISOLTRAP mass spectrometer
S. Kreim[a,b], D. Atanasov[b], D. Beck[c], K. Blaum[b], Ch. Böhm[b], Ch. Borgmann[b], M. Breitenfeldt[d], T.E. Cocolios[a,e], D. Fink[b,f], S. George[b], A. Herlert[g], A. Kellerbauer[b], U. Köster[h], M. Kowalska[a], D. Lunney[i], V. Manea[i], E. Minaya Ramirez[c,j], S. Naimi[b], D. Neidherr[c], T. Nicol[k], R.E. Rossel[l,m], M. Rosenbusch[n], L. Schweikhard[n], J. Stanja[o], F. Wienholtz[n], R.N. Wolf[n], K. Zuber[o]
Published 15 December 2013

NIM B 317 B, 550 (2013) http://www.sciencedirect.com/science/article/pii/S0168583X13008914
New developments of the in-source spectroscopy method at RILIS/ISOLDE
B.A. Marsh[a], B. Andel[b], A.N. Andreyev[c], S. Antalic[b], D. Atanasov[d], A.E. Barzakh[e], B. Bastin[f], Ch. Borgmann[d], L. Capponi[g], T.E. Cocolios[a,h], T. Day Goodacre[a,h], M. Dehairs[g], X. Derkx[i], H. De Witte[g], D.V. Fedorov[e], V.N. Fedosseev[a], G.J. Focker[a], D.A. Fink[j,a], K.T. Flanagan[h], S. Franchoo[k], L. Ghys[g], M. Huyse[g], N. Imai[l], Z. Kalaninova[b], U. Köster[m], S. Kreim[a,d], N. Kesteloot[g], Yu. Kudryavtsev[g], J. Lane[i], N. Lecesne[f], V. Liberati[i], D. Lunney[k], K.M.

Lynch[a, h], V. Manea[k], P.L. Molkanov[e], T. Nicol[n], D. Pauwels[o], L. Popescu[o], D. Radulov[g], E. Rapisarda[a], M. Rosenbusch[p], R.E. Rossel[q], S. Rothe[a], L. Schweikhard[p], M.D. Seliverstov[e, c], S. Sels[g, c], A.M. Sjödin[f], V. Truesdale[c], C. Van Beveren[g], P. Van Duppen[g], K. Wendt[q], F. Wienholtz[p], R.N. Wolf[p], S.G. Zemlyanoy[r]
Published 15 December 2013

NIM B 317 B, 565 (2013) 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 15 December 2013

NIM B 317 B, 603 (2013) http://www.sciencedirect.com/science/article/pii/S0168583X13008197
Nuclear physics experiments with ion storage rings
Yu.A. Litvinov[a, b], S. Bishop[c], K. Blaum[d], F. Bosch[a], C. Brandau[e, f], L.X. Chen[g], I. Dillmann[a, f], P. Egelhof[a], H. Geissel[a, f], R.E. Grisenti[a, h], S. Hagmann[a, h], M. Heil[a], A. Heinz[i], N. Kalantar-Nayestanaki[j], R. Knöbel[a, f], C. Kozhuharov[a], M. Lestinsky[a], X.W. Ma[k], T. Nilsson[i], F. Nolden[a], A. Ozawa[l], R. Raabe[m], M.W. Reed[n], R. Reifarth[h], M.S. Sanjari[a, e], D. Schneider[o], H. Simon[a], M. Steck[a], T. Stöhlker[a, p, q], B.H. Sun[r], X.L. Tu[a, k], T. Uesaka[s], P.M. Walker[t], M. Wakasugi[s], H. Weick[a], N. Winckler[a, d], P.J. Woods[u], H.S. Xu[k], T. Yamaguchi[v], Y. Yamaguchi[s], Y.H. Zhang[k]
Published 15 December 2013

Phys. Lett. B 727 (2013) 371 http://www.sciencedirect.com/science/article/pii/S0370269313008617
Multiplicity dependence of the average transverse momentum 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, L.D. Hanratty, P.G. Jones, A. Jusko, M. Krivda, G.R. Lee, R.C. Lemmon, R. Lietava, A. Palaha, P. Petrov, R. Romita, P.A. Scott, O. Villalobos-Baillie
Published 18 December 2013

---

***2. News to report***

**a. Radiometric Statistics course for Sellafield.** On 28th – 29th November, Dr Christian Diget ran a two day CPD course on Radiometric Statistics for Sellafield Ltd. The course focused on statistical methods in radiation control, specifically targeted towards the range of applications at Sellafield, including gate monitor alarms, minimum detectable activities and evaluation of systematic errors. The course was taken by seven members of the Sellafield radiometry team and was arranged at the request of the company.
*Contribution by Christian Aaen Diget*
*christian.diget@york.ac.uk (York)*

**b. Top 10 physics breakthroughs for 2013,** as judged by Physics World magazine, have been announced here. The top spot in the list was taken by the IceCube South Pole Neutrino Observatory for making the first observations of high-energy cosmic neutrinos.
Nine other achievements were highly commended and covered topics from nuclear physics to nanotechnology, including nuclear physics goes pear-shaped: awarded to the international team of nuclear physicists that used the REX-ISOLDE and MINIBALL facilities at CERN to create and study the first pear-shaped nucleus.
*Contribution by Peter Butler*
*peter.butler@liverpool.ac.uk (Liverpool)*

---

***3. Outreach Activity***

**Public Talk.** On 27th November Alison Laird gave a presentation to Keighley Astronomical Society at the Star Centre on 'Nuclear astrophysics - from the lab to the stars'. It was attended by 55 people.

*Contribution by Alison Laird*
*alison.laird@york.ac.uk (York)*

**School Talk.** On 29th November Gemma Wilson went to Millthorpe School in York to talk to some female GCSE-level students as

part of their 'Girls Inspired' event. About 20 girls were in attendance, and she spoke to them all in small groups over lunch about what a nuclear physicist does, and the career path she took to become one. She answered questions about life at university, how to decide which university to go to, and studying science beyond GCSE.
*Contribution by Gemma Wilson* *gemma.wilson@york.ac.uk (York)*

**Christmas Lectures.** David Evans has given a series of Christmas Lectures during December:
– 10th December, IOP West Midlands Christmas Lecture at the University of Birmingham, 'From the BIG Bang to the LHC – Exploring what we're really made of and How we came to be…', to about 300 members of the public.
– 11th December, BCS/IET Christmas Lecture at the University of Coventry, 'Big Bang with the World's Largest Machine', to over 300 members of the public.
– 17th December, Christmas Schools Lecture at the University of Birmingham, 'The Physics of Hot and Cold', to about 300 Year 7 pupils.
*Contribution by Lee Barnby* *l.barnby@bham.ac.uk and David Evans* *de@hep.ph.bham.ac.uk (Birmingham)*

**Nuclear Physics Master Class.** This autumn has seen thirty local secondary school students complete the fifth Liverpool Nuclear Physics Master Class. Established in 2011 and targeted at year 12 students in Merseyside schools, the rationale is to showcase modern nuclear physics to young people, within a research driven university setting.
Students apply for their place, with successful applicants attending five full-afternoon sessions in Liverpool University's award-winning Central Teaching Laboratory.
Each session contained a talk on a Nuclear Physics research area, with subjects chosen to reflect the full diversity of the Liverpool group's STFC-funded research. These ranged from the pure research topics *"The Limits of Nuclear Existence" (*Robert Page), *"Extreme alchemy - why is Gold yellow?"* (Rodi Herzberg) and *"ALICE in Wonderland: a tale to discover at the LHC"* (Rossella Romita), through to more applied aspects *"Nuclear Physics: From nucleons to medical diagnosis"* (Paul Nolan) and *"The future of gamma-ray imaging"* (Laura Harkness).

Three of the workshops included practical experiments, with current Nuclear Physics Ph.D. students and Physics undergraduate students acting as demonstrators. The experiments were selected and adapted from those available to year 2 and 3 physics undergraduates at Liverpool and used state of the art radiation detection equipment in the Physics Department's new radiation teaching laboratory. A fourth session focused on best practice in science communication in which students were invited to choose a topic on which to prepare a research-style poster. The students arrived at their choice following discussions with the Nuclear Physics postgraduate researchers. Students worked in pairs with somebody from another school on their poster projects. At the final workshop on 5th December attended by over sixty people, the students presented their posters to their peers, teachers and families in a conference-style event. Students were presented with certificates and took away their posters to be displayed in school.
The next master class will run during the half-term break in February 2014. This event will be an intensive, two-day version which makes the activities accessible to those students who, for practical reasons cannot attend the five afternoon sessions. In view of the overwhelming demand for places, the Liverpool Nuclear Physics Group is looking at how it might increase the number of Master Classes in future.
*Contribution by Robert Page* *rdp@ns.ph.liv.ac.uk (Liverpool)*

**Physics FUNdamentals: An outreach programme by Chantal Nobs.** In addition to recently starting my PhD in nuclear physics at the University of Brighton I am passionate about doing outreach work. In July 2013 I became a STEM (Science, Technology, Engineering and Mathematics) Ambassador and shortly afterwards I created PHYSICS FUNdamentals. A website where the general public, especially children can go to read science news at a suitable level; and find places on the web and in the UK to interact with science. An interactive lab provides games, to attract a younger audience, and the discussion forum provides the opportunity to ask science questions. The key feature of the site is the "science at home" page, which includes videos of my younger brother, Marcus, and myself doing various

experiments using easy-to-find items. More recently, Marcus and I have done some of these experiments, and more, at birthday parties.

All the children get involved in a range of hands-on experiments and watch some demonstrations, throughout there are discussions about the science behind the experiments and they are encouraged to be creative. The parties have been well received by both the children and the adults, and I am constantly trying to expand the number of topics covered by the experiments.
I hope to expand PHYSICS FUNdamentals and reach a wider audience to inspire younger generations as well as informing the general public. To find out more visit the website at: www.physicsfundamentals.org.
*Contribution by Chantal Nobs*
*C.Nobs@brighton.ac.uk (Brighton)*

---

***4. Media Interactions***

**100 Second Science**
http://physicsworld.com/cws/Landing/100secondscience.do
What are the big unanswered questions in nuclear physics?
http://physicsworld.com/cws/article/multimedia/2013/nov/25/what-are-the-big-unanswered-questions-in-nuclear-physics
How do you make a pear shaped nucleus?
http://physicsworld.com/cws/article/multimedia/2013/nov/19/how-do-you-make-a-pear-shaped-nucleus
*Contribution by Peter Butler*
*peter.butler@liverpool.ac.uk and Elizabeth Cunningham e.cunningham@surrey.ac.uk (Surrey)*