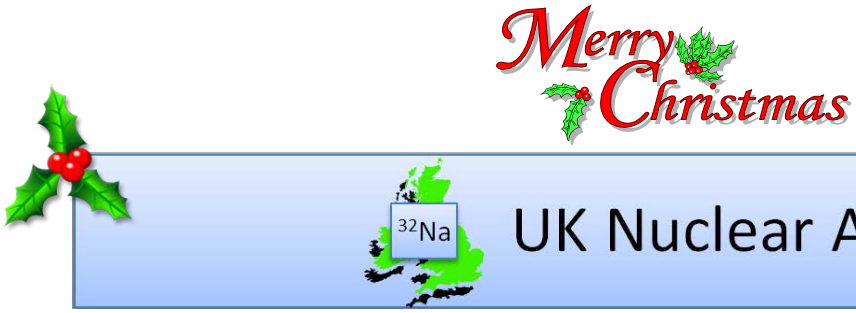

December 2015 Issue 30

In this issue,

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

Nuclear Physics Public Engagement Website: www.stfc.ac.uk/NuclearPhysicsForYou

Nuclear Physics Outreach Poster – order hardcopies from STFC free of charge here

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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.

JHEP 11 (2015) 127 http://link.springer.com/article/10.1007/JHEP11(2015)127
Centrality dependence of inclusive J/ψ production in p-Pb collisions at $\sqrt{s_{NN}}$ = 5.02 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, R. Romita, O. Villalobos Baillie, N. Zardoshti
*Published 19 November 2015

Phys. Rev. C 92, 055806 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.055806
Spectroscopy of ^{19}Ne for the thermonuclear ^{15}O(α,γ)^{19}Ne and ^{18}F(p,α)^{15}O reaction rates
A. Parikh[1,2,*], A. M. Laird[3], N. de Séréville[4], K. Wimmer[5], T. Faestermann[6], R. Hertenberger[7], D. Seiler[6], H.-F. Wirth[7], P. Adsley[3], B. R. Fulton[3], F. Hammache[4], J. Kiener[8], and I. Stefan[4]
*Published 20 November 2015

Phys. Scr. T166, 014009 (2015) http://iopscience.iop.org/article/10.1088/0031-8949/2015/T166/014009
Study of projectile fragmentation reaction with isochronous mass spectrometry
X L Tu[1,2,3], B Mei[1,2], Y H Zhang[2], H S Xu[2], Yu A Litvinov[1,2,3], W J Huang[2,4], Z Podolyak[5],A Kelic-Heil[1], W Zhang[2,4], S A Litvinov[1], K Blaum[3], X H Zhou[2], P Shuai[2,6], M Wang[2], B S Gao[1,2,3,4],X C Chen[1,2,4], Y J Yuan[2], J W Xia[2], J C Yang[2], Z G Hu[2], X W Ma[2], B H Sun[7], X L Yan[2], R S Mao[2],Z Y Sun[2], G Q Xiao[2], X Xu[2,4], P M Walker[5], T Yamaguchi[8], F Bosch[1], N Winckler[1], R J Chen[2],Y M Xing[2,4], C Y Fu[2,4], D W Liu[2,4], Q Zeng[2,6], Z Ge[2,4], Y Sun[9], H W Zhao[2] and T C Zhao[2]
* Published 26 November 2015

*Also including missed publications from previous months.

Phys. Rev. C 92, 054326 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.054326
Shape study of the N=Z nucleus ^{72}Kr via β decay
J. A. Briz[1,*], E. Nácher[1,2], M. J. G. Borge[1,3], A. Algora[2,4], B. Rubio[2], Ph. Dessagne[5,6], A. Maira[1], D. Cano-Ott[2,7], S. Courtin[5,6], D. Escrig[1], L. M. Fraile[8], W. Gelletly[9], A. Jungclaus[1], G. Le Scornet[3], F. Maréchal[5,6], Ch. Miehé[5,6], E. Poirier[5,6], A. Poves[10], P. Sarriguren[1], J. L. Taín[2], and O. Tengblad[1]
*Published 30 November 2015

JHEP 11 (2015) 205 http://link.springer.com/article/10.1007/JHEP11(2015)205
Centrality dependence of high-p_T D meson suppression 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, R. Romita, O. Villalobos Baillie, N. Zardoshti
*Published 30 November 2015

Bulg. J. Phys. vol.42 no.4, 354 (2015) http://www.bjp-bg.com/paper.php?id=770
Shapes and Dynamics from the Time-Dependent Mean Field
P.D. Stevenson, P.M. Goddard, A. Rios
Published December 2015

Bulg. J. Phys. vol.42 no.4, 382 (2015) http://www.bjp-bg.com/paper.php?id=773
High-K Isomers and the Role of β_6 Deformation
P.M. Walker[1], H.L. Liu[2], F.R. Xu[3]
Published December 2015

Phys. Rev. Lett. 115, 242502 (2015) http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.115.242502
New Short-Lived Isotope ^{221}U and the Mass Surface Near N=126
J. Khuyagbaatar[1,2,*], A. Yakushev[1,2], Ch. E. Düllmann[1,2,3], D. Ackermann[2,†], L.-L. Andersson[1], M. Block[1,2,3], H. Brand[2], D. M. Cox[4], J. Even[1,‡], U. Forsberg[5], P. Golubev[5], W. Hartmann[2], R.-D. Herzberg[4], F. P. Heßberger[1,2], J. Hoffmann[2], A. Hübner[2], E. Jäger[2], J. Jeppsson[5], B. Kindler[2], J. V. Kratz[3], J. Krier[2], N. Kurz[2], B. Lommel[2], M. Maiti[6,§], S. Minami[2], A. K. Mistry[4], Ch. M. Mrosek[3], I. Pysmenetska[2], D. Rudolph[5], L. G. Sarmiento[5], H. Schaffner[2], M. Schädel[2], B. Schausten[2], J. Steiner[2], T. Torres De Heidenreich[2], J. Uusitalo[7], M. Wegrzecki[8], N. Wiehl[1,3], and V. Yakusheva[1]
Published 10 December 2015

Phys. Rev. C 92, 069801 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.069801
Comment on "Evidence for narrow resonant structures at W≈1.68GeV and W≈1.72 GeV in real Compton scattering off the proton"
D. Werthmüller[1,2], L. Witthauer[2], D. I. Glazier[1], and B. Krusche[2]
Published 11 December 2015

Phys. Rev. Lett. 115, 252501 (2015) http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.115.252501
Three New Low-Energy Resonances in the ^{22}Ne(p,γ)^{23}Na Reaction
F. Cavanna[1], R. Depalo[2], M. Aliotta[3], M. Anders[4,5], D. Bemmerer[4,†], A. Best[6], A. Boeltzig[7], C. Broggini[8], C. G. Bruno[3], A. Caciolli[2], P. Corvisiero[1], T. Davinson[9], A. di Leva[10], Z. Elekes[11], F. Ferraro[1], A. Formicola[6], Zs. Fülöp[11], G. Gervino[12], A. Guglielmetti[13], C. Gustavino[14], Gy. Gyürky[11],G. Imbriani[10], M. Junker[6], R. Menegazzo[8], V. Mossa[15], F. R. Pantaleo[15], P. Prati[1], D. A. Scott[9], E. Somorjai[11], O. Straniero[16], F. Strieder[17,*], T. Szücs[4], M. P. Takács[4,5], and D. Trezzi[13] (The LUNA Collaboration)
Published 15 December 2015

Phys. Lett. B 751, 358-370 (2015) http://www.sciencedirect.com/science/article/pii/S0370269315007996
Coherent ψ(2S) photo-production in ultra-peripheral 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, 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 17 December 2015

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2. News to Report

a. The importance of Nuclear data redux.
Last month I wrote a brief note about the importance of nuclear data. It is important not that we know something about radioactive decays just for the purposes of understanding nuclear structure and the fundamental interactions but also that we know their properties in detail for many other reasons.

For instance it is clearly important to know the details of the decay scheme of a nuclide that is used for therapeutic purposes.
In November the question was how to determine the B(GT) distributions as a function of excitation energy for the radioactive decays of the host of fission products produced in nuclear reactors. The aim was to be able to measure them precisely since they could then be used to determine the Decay Heat in reactors and the primary reactor antineutrino spectrum in summation calculations. It is not the only area where information is lacking in relation to reactor operation. We are all familiar with the key role played by delayed neutron emitters in reactor operation. Surprisingly our knowledge of beta-delayed neutron emitters is rather limited. There are at least three reasons why we would like better studies of beta-delayed neutrons and this is one of them. Firstly this is a decay mode of importance for nuclei near the waiting points in the astrophysical r-process, especially near the N=82 and 126 closed shells. Secondly they carry information about nuclear structure and thirdly the knowledge can be important for reactor operation as indicated above.
We have taken a number of steps to improve our knowledge of beta-delayed neutron emission. For example we have used Total Absorption Spectroscopy to determine the beta decay intensity to states above the neutron separation energy followed by gamma ray emission in the decays of ^{87,88}Br and ^{94}Rb [1]. We found a surprisingly large gamma-ray intensity in all three cases for states well beyond the region of excitation energy where neutron emission is hindered by low neutron energy. The results can be explained by an increase in the photon strength function relative to the neutron strength function. This would affect the neutron capture rate and hence alter r-process abundance calculations.
We have also carried out experiments at the GSI Fragment Recoil Separator (FRS) to study beta-delayed neutron emission of Au, Hg, Tl, Pb and Bi isotopes close to and beyond N= 126. The FRS provided identification of the ions by A and Z on an ion-by-ion basis and the neutrons were detected with the BELEN [2] neutron array. The half-lives and delayed neutron probabilities were measured. These are the heaviest beta-delayed neutron emitters observed to date. The results have been submitted for publication.
BELEN has been carefully characterised [3] and will be part of the BRIKEN array that is to be assembled at RIKEN for a campaign of delayed neutron measurements there. A number of delayed neutron emitters have also been studied at Jyvaskyla using the IGISOL plus Penning traps to produce isobarically separated sources.
Given the improved beams at RIKEN and the cleanliness of the sources produced at Jyvaskyla one can expect to see many more measurements of this form of decay.
References:

1. J.L.Tain et al.,Phys.Rev.Letters 115 (2015) 36-46
2. F.Calvino et al.,technical design report for BELEN detector in:NUSTAR_FAIR,2014
3. J.Agramunt et al., N.I.M A807 (2016) 69-78

Contribution by Bill Gelletly
W.Gelletly@surrey.ac.uk (Surrey).

b. 27th ASRC International Workshop "Nuclear Fission and Exotic Nuclei", Tokai, Japan, 1-2 December 2015 and a Satellite meeting on "Future facility at J-PARC" on 30 November 2015.

An international workshop: "Nuclear Fission and Exotic Nuclei" was held on 1st-2nd December 2015, organized and co-chaired by Prof. Andrei Andreyev from Department of Physics, University of York and Advanced Science Research Centre (ASRS) of Japan Atomic Energy Agency (JAEA), Tokai, Japan. The meeting was devoted to new experimental and theoretical achievements in fission, super-heavy nuclei, nuclear reaction and structure of exotic nuclei. Discussions were also given on the planned new facility at J-PARC, where 400 MeV proton beam can be used. This is the 5th meeting in the series of workshops organized by Andreyev in JAEA, Tokai.

Contribution by Andrei Andreyev
andrei.andreyev@york.ac.uk *(York).*

3. Outreach Activity

Online outreach activity *I'm a Scientist, Get me out of here:* is inviting nuclear physicists to apply for the next event in March!
STFC is funding two zones taking place March 7th- 18th and applications are open now at imascientist.org.uk/scientist-apply
- Gravity Zone: a themed zone where with five scientists whose research is related to Gravity.
- Iridium Zone: a general science zone with a panel of five scientists working in different science fields.
In *I'm a Scientist,* you answer questions posted by school students at imascientist.org.uk and engage directly with them in live text-based chats alongside four fellow scientists in your zone. The students then vote for their favourite scientist to win £500 to communicate their research with the public.
By taking part you develop your communication skills, gain a fresh perspective on your work, and find out what young people really think about science. It's a unique and exciting way to show students that scientists are real people like them and raise awareness of STEM careers.
Everything in the activity happens online so you can do all this from your laptop at work, from your phone on the train, or from anywhere in between! Please apply by ***Sunday 24th January***.
Read more at imascientist.org.uk/scientists or contact Dr Angela Monasor: T: +44 (0) 1225 326 892, E: angela@gallomanor.com.
I'm a Scientist, Get me out of here!
imascientist.org.uk | imascientist.ie | @imascientist

Media and Communications Training
The Science and Technology Facilities Council offers free Media Skills training and Writing about your Research courses for researchers, as part of its Public Engagement programme.
The Media Skills training develops skills in working with television, radio, newspapers and other media. The next course date is 17 February 2016, in London
The Writing about your Research course trains researchers to write about their research for non-specialist readers in a variety of contexts. The next course date is 13 January 2016, in London.
A two-day residential combination of the courses is also available. These are held at the Kavli Royal Society International Centre in Buckinghamshire. The next dates are 14/15 March 2016.
STFC offers bursaries to pay the course fees and T&S costs for eligible researchers. The courses are run for us by the Royal Society. To book a place visit the Royal Society website
Once you have a confirmed place, go to the STFC website to apply for an STFC bursary.
The STFC contact for more information is Jane Butt Tel 01793 442030

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4. Media Interactions

The beauty of equations – Radio 4
http://www.bbc.co.uk/programmes/b06r50wh Listen to Ron Johnson and Jim Al-Khaili discuss the beautiful equations in Jim's PhD thesis and what makes an equation beautiful.
Contribution by Ron Johnson r.johnson@surrey.ac.uk (Surrey).

Inside Science – Radio 4
http://www.bbc.co.uk/programmes/b06pxt44
Jaime Norman (Nuclear Physics PhD student, Liverpool) has been featured on BBC Radio 4's Inside Science programme talking about the ALICE experiment at CERN.
You can listen to the programme here. Jaime's piece begins around 5:35.


Jaime Norman, and his colleagues working in the ALICE experiment (Image: Laurent Egli/CERN)

This also features two physicists at the University of Birmingham: Kay Graham and Orlando Villalobos-Baile.
He is also mentioned in a piece in the Guardian written by the presenter, Adam Rutherford, highlighting how Science is vital if Britain is to prosper.
Contribution by Marielle Chartier m.chartier@liverpool.ac.uk (Liverpool).