UK Nuclear Activity

January 2017 Issue 43

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 January*

If you are publishing a paper that you think would be of media value please contact Wendy Ellison, STFC Press Officer. 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 93, 044336 (2016) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.93.044336
β decay of the exotic Tz=−2 nuclei ^{48}Fe, ^{52}Ni, and ^{56}Zn
S.E.A.Orrigo, B.Rubio, Y.Fujita, W.Gelletly, J.Agramunt, A.Algora, P.Ascher, B.Bilgier, B.Blank, L.Caceres, R.B.Cakirli, E.Ganioglu, M.Gerbaux, J.Giovinazzo, S.Grevy, O.Kamalou, H.C.Kozer, L.Kucuk, T.Kurtukian-Nieto, F.Molina, L.Popescu, A.M.Rogers, G.Susoy, C.Stodel, T.Suzuki, A.Tamii, J.C.Thomas.
*Published 27 April 2016

Phys. Rev. Lett. 117, 162501 (2016) http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.117.162501
Two-Proton Radioactivity of ^{67}Kr
T.Goigoux, P.Ascher, B.Blank, M.Gerbaux, J.Giovinazzo, S.Grevy, T.Kurtukian Nieto, C.Magron, P.Doornenbal, G.G.Kiss, S.Nishimura, P.-A.Soderstrom, V.H.Phong, J.Wu, D.S.Ahn, N.Fukuda, N.Inabe, T.Kubo, S.Kubono, H.Sakurai, Y.Shimizu, T.Sumikama, H.Suzuki, H.Takeda, J.Agramunt, A.Algora, V.Guadilla, A.Montaner-Piza, A.I.Morales, S.E.A.Orrigo, B.Rubio, Y.Fujita, M.Tanaka, W.Gelletly, P.Aguilera, F.Molina, F.Diel, D.Lubos, G.de Angelis, D.Napoli, C.Borcea, A.Boso, R.B.Cakirli, E.Ganioglu, J.Chiba, D.Nishimura, H.Oikawa, Y.Takei, S.Yagi, K.Wimmer, G.de France, S.Go, and B.A.Brown.
*Published 14 October 2016

Phys. Rev. C 94, 054908 (2016) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.054908
D-meson production in p-Pb collisions at $\sqrt{s_{NN}}$ = 5.02 TeV and in pp collisions at $\sqrt{s}$ = 7 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. Lemmon, R. Lietava, J. Norman, O. Villalobos Baillie, N. Zardoshti
*Published 23 November 2016

*Also including missed publications from previous months.

Phys. Rev. C 94, 054321 (2016) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.054321
Changes in nuclear structure along the Mn isotopic chain studied via charge radii
H. Heylen[1,*], C. Babcock[2,3,†], R. Beerwerth[4,5], J. Billowes[6], M. L. Bissell[1,6], K. Blaum[7], J. Bonnard[8], P. Campbell[6], B. Cheal[2], T. Day Goodacre[6,9], D. Fedorov[10], S. Fritzsche[4,5], R. F. Garcia Ruiz[1], W. Geithner[11], Ch. Geppert[12,13], W. Gins[1], L. K. Grob[9,13], M. Kowalska[9], K. Kreim[7], S. M. Lenzi[14], I. D. Moore[15,16], B. Maass[13], S. Malbrunot-Ettenauer[9], B. Marsh[9], R. Neugart[7,12], G. Neyens[1], W. Nörtershäuser[13], T. Otsuka[17], J. Papuga[1], R. Rossel[9], S. Rothe[9], R. Sánchez[11], Y. Tsunoda[18], C. Wraith[2], L. Xie[6], X. F. Yang[1], and D. T. Yordanov[7,‡]
*Published 28 November 2016

MNRAS 465, 4817 (2016) http://mnras.oxfordjournals.org/content/465/4/4817.abstract
Neon and Sodium ejecta from intermediate-mass stars: The impact of the new LUNA rate for ^{22}Ne(p,g)^{23}Na
A. Slemer, P. Marigo, D. Piatti, M. Aliotta, D. Bemmerer,A. Best, A. Boeltzig, A. Bressan, C. Broggini C. G. Bruno, A. Caciolli, F. Cavanna, G. F. Ciani, P. Corvisiero, T. Davinson, R. Depalo, A. Di Leva, Z. Elekes, F. Ferraro, A. Formicola, Zs. Fülöp, G. Gervino, A. Guglielmetti, C. Gustavino, G. Gyürky, G. Imbriani, M. Junker, R. Menegazzo, V. Mossa, F. R. Pantaleo, P. Prati, O. Straniero, T. Szücs, M. P. Takács, D. Trezzi (LUNA Collaboration)
*Published 29 November 2016

Physics Letters B 763 238 (2016) http://www.sciencedirect.com/science/article/pii/S0370269316306190
Jet-like correlations with neutral pion triggers in pp and central Pb–Pb collisions at 2.76 TeV
ALICE Collaboration, UK Authors: D. Alexandre, H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, M. A. S. Figueredo, K. L. Graham, P. G. Jones, A. Jusko, M. Krivda, R. Lemmon, R. Lietava, J. Norman, O. Villalobos Baillie, N. Zardoshti
*Published 10 December 2016

Phys. Rev. C 94, 065803 (2016) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.94.065803
Measurement of radiative proton capture on ^{18}F and implications for oxygen-neon novae reexamined
C. Akers[1,2,*], A. M. Laird[2], B. R. Fulton[2], C. Ruiz[1], D. W. Bardayan[3,†], L. Buchmann[1], G. Christian[1,‡], B. Davids[1], L. Erikson[4], J. Fallis[1], U. Hager[5,§], D. Hutcheon[1], L. Martin[1], A. St. J. Murphy[6], K. Nelson[7], D. Ottewell[1], A. Rojas[1], and A. Spyrou[8,9,10]
*Published 15 December 2016

Phys. Lett. B 764, 265 (2017) http://www.sciencedirect.com/science/article/pii/S0370269316307018
Towards saturation of the electron-capture delayed fission probability: The new isotopes ^{240}Es and ^{236}Bk
J. Konki[a], J. Khuyagbaatar[b,c,,], J. Uusitalo[a], P.T. Greenlees[a], K. Auranen[a,1], H. Badran[a], M. Block[b,c,d], R. Briselet[e], D.M. Cox[f,2], M. Dasgupta[g], A. Di Nitto[c,d], Ch.E. Düllmann[b,c,d], T. Grahn[a], K. Hauschild[h], A. Herzán[a,3], R.-D. Herzberg[f], F.P. Heßberger[c], D.J. Hinde[g], R. Julin[a], S. Juutinen[a], E. Jäger[c],B. Kindler[c], J. Krier[c], M. Leino[a], B. Lommel[c], A. Lopez-Martens[h], D.H. Luong[g], M. Mallaburn[i], K. Nishio[j],J. Pakarinen[a], P. Papadakis[a], J. Partanen[a], P. Peura[a,4], P. Rahkila[a], K. Rezynkina[h], P. Ruotsalainen[a], M. Sandzelius[a], J. Sarén[a], C. Scholey[a], J. Sorri[a], S. Stolze[a], B. Sulignano[e], Ch. Theisen[e], A. Ward[f], A. Yakushev[b,c], V. Yakusheva[b,c]
Published 10 January 2017

Astrophysical Journal, 834, 165 (2017) http://dx.doi.org/10.3847/1538-4357/834/2/165
Non-extensive statistics to the cosmological lithium problem
S. Q. Hou[1], J. J. He[1,2,11], A. Parikh[3,4], D. Kahl[5], C. A. Bertulani[6], T. Kajino[7,8,9], G. J. Mathews[8,10], and G. Zhao[2]
Published 11 January 2017

Phys. Rev. C 95, 014313 (2017) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.95.014313
Ultrafast-timing lifetime measurements in ^{94}Ru and ^{96}Pd: Breakdown of the seniority scheme in N=50 isotones
H. Mach, A. Korgul M. Górska, H. Grawe, I. Matea, M. Stanoiu, L. M. Fraile, Yu. E. Penionzkevich, F. De Oliviera Santos, D. Verney, S. Lukyanov, B. Cederwall, A. Covello, Z. Dlouhý, B. Fogelberg, G. De France, A. Gargano, G. Georgiev, R. Grzywacz, A. F. Lisetskiy, J. Mrazek, F. Nowacki, W. A. Plóciennik, Zs. Podolyák, S. Ray, E. Ruchowska, M.-G. Saint-Laurent, M. Sawicka, Ch. Stode, O. Tarasov
Published 13 January 2017

Eur. Phys. J. C (2017) 77:33 http://link.springer.com/article/10.1140/epjc/s10052-016-4571-1
Charged-particle multiplicities in proton–proton collisions at √s = 0.9 to 8 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, K. Krivda, G. R. Lee, R. Lemmon, R. Lietava, J. Norman, R. Romita, O. Villalobos Baillie, N. Zardoshti
Published 17 January 2017

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2. News to Report

a. Jacek Dobaczewski appointed as Editor-in-Chief of Journal of Physics G

IOP Publishing is delighted to announce that Professor Jacek Dobaczewski has been appointed as the new Editor in Chief of Journal of Physics G: Nuclear and Particle Physics (JPhysG). His term began on 1 January 2017.

A leading nuclear theorist, Prof Dobaczewski is known for his broad contributions to nuclear structure theory. His current research focuses on deriving new energy density functionals to obtain a precise description of all nuclei.

Before joining the University of York in the UK, Prof Dobaczewski was a professor at the University of Warsaw, Poland, and a distinguished FIDIPRO Professor at the University of Jyväskylä in Finland.

In accepting this position, Prof Dobaczewski said "I am very pleased and honoured to accept the role, and I am very much looking forward to working towards the success and high standing of JPhysG."

Journal of Physics G is a journal for the Nuclear and Particle Physics communities owned and operated by IOP Publishing, a not-for-profit subsidiary of the Institute of Physics.

Contribution by Adam Day
Adam.Day@iop.org (IOP)

b. Around 300 Nuclear Physicists Meet in Darmstadt — GSI and FAIR accelerator center play an outstanding role

Around 300 nuclear physicists from around the world met in Darmstadt from January 11 to 13 for an international conference of the Nuclear Physics European Collaboration Committee (NuPECC) — an expert committee of the European Science Foundation (ESF).

The three-day event — known as a Town Meeting — was organized by GSI Helmholtzzentrum für Schwerionenforschung.

The purpose of the conference was to set the long-term course and lay out the Long Range Plan for the future of European nuclear physics, thus marking a key milestone for the next decade.

The Long Range Plan regularly establishes the perspectives and prospects of the European nuclear physics community for the next ten years and beyond. Its contents are presented to the European and national bodies for science funding as planning suggestions. “The Long Range Plan provides the community with an opportunity to formulate how Europe should position itself in order to remain a world leader and competitive in an international context,” explained Professor Angela Bracco, NuPECC Chair. “GSI and the future FAIR accelerator center play an outstanding role in this effort.” According to Bracco, the new possibilities for research in Darmstadt are unique and are expected to produce ground breaking new insights for nuclear research.

Professor Paolo Giubellino, the new Scientific Managing Director of GSI and FAIR, since January 1, 2017, reported on the FAIR project at the Town Meeting, emphasizing the outstanding role played by the Darmstadt location and FAIR/GSI in this area of science. “The FAIR project builds on the excellence of GSI and guarantees a promising future development with outstanding experimental facilities within European research.”

The members of NuPECC come from more than 20 European countries. They represent the European nuclear physics community and important research centers and funding agencies. The tasks of the renowned expert committee include providing the European Science Foundation and other bodies with suggestions and recommendations, and coordinating activities in the fields of nuclear and hadron physics within Europe.

The UK NuPECC members are Alex Murphy and Paul Nolan. Paul Nolan has served his term and will be replaced by Rodi Herzberg.

The UK has some other key roles in the work of NuPECC:

John Simpson is joint convenor of the Nuclear Structure and Reaction Dynamics chapter, and presented this to NuPECC in Darmstadt,

Alison Laird is joint convenor of the Nuclear Astrophysics chapter and several members of the community were involved in providing input to the chapters.

Contribution from GSI news archive edits by John Simpson john.simpson@stfc.ac.uk (Daresbury)

c. Nuclear Physics UK Community Meeting January 2017

The annual meeting of the UK nuclear physics community took place at Arden House, Warwick Conferences, on 5-6th January 2017. There were 54 attendees representing all the UK institutions in the experimental and theoretical community.

The meeting discussed the overall status of the subject, the NuPECC long range plan and heard reviews of the UK's major projects (ISOL SRS, ALICE and JLab Upgrades and NuSTAR). The meeting discussed the status of the UK roadmap and presentations from possible new project grant bids were given.

A session on outreach was very well received with excellent presentations from Laura Harkness-Brennan on master class activities in the community, John Roberts on "Teach the Teachers", Ale Pastore on the Building block LEGO activity and finally an overview of all the public engagement activities in STFC from Elizabeth Cunningham.

Invited presentations were also given by Paul Davies on the nuclear data network and Stephen Judge from the National Physical Laboratory on a new accelerator initiative.

Mirion Technologies were thanked for providing sponsorship for the event and hosting the reception.

Contribution by John Simpson john.simpson@stfc.ac.uk (Daresbury)

d. Report from the NuPECC town meeting Darmstadt 11-13 Jan 2017

The NuPECC town meeting to discuss the Long Range Plan 2017 was held in Darmstadt Jan 11th – 13th and was well attended with 270 registered participants from 34 countries. The six working groups on Hadron Physics (WG1), Properties of Strong-Interaction Matter (WG2), Nuclear Structure and Reaction Dynamics (WG3), Nuclear Astrophysics (WG4), Symmetries and Fundamental Interactions (WG5) and Applications and Societal Benefits (WG6) presented their draft chapters, followed by a lively discussion of the recommendations.

Please find information about the town meeting here and the programme with the presentations and the draft documents at this link to the meeting programme. Comments on the drafts and recommendations are still welcome and should be made in writing to the working group leaders.

The programme was rounded off by presentations on the status of large scale facilities in Europe and Russia and presentations on the international context.

Contribution by Rodi Herzberg R.Herzberg@liverpool.ac.uk (Liverpool)

e. TALENT course 2017

Applications are open for the 2017 TALENT course on Theory for exploring Nuclear Structure experiments.

The recently established initiative, Nuclear TALENT (Training in Advanced Low Energy Nuclear Theory - see http://www.nucleartalent.org), is a multi-national network of several European and North American institutions, which aims to develop a broad curriculum that will serve as a platform for cutting-edge theory of nuclei and their reactions.

This year the Nuclear TALENT initiative organizes a course on "Theory for Exploring Nuclear Structure Experiments" to be held at The European Center for Theoretical Nuclear Physics and Related Areas (ECT*), Trento, Italy from July 3 to July 21 2017.

The lecturers will be:

1. Alex Brown (MSU) – organiser, 2. Alexandra Gade (MSU), 3. Robert Grzywacz (Oak Ridge National Laboratory), 4. Morten Hjorth-Jensen – organiser (MSU & University of Oslo), 5. Gustav Jansen (Oak Ridge National Laboratory).

How to apply and teaching material

The deadline for applications is April 15, 2017. For more information on how to apply see http://ectstar.eu/node/797, see also http://ectstar.eu/node/2240. A detailed content list can be found at http://nucleartalent.github.io/NuclearStructure/doc/web/course.html.

The target groups are Master of Science and PhD students and early postdoctoral researchers, both experimentalists and theorists interested in models for nuclear

structure, phenomenological techniques for interpreting and predicting the structure of stable as well as exotic nuclei. More experienced researchers may apply, but will be considered only on a fully-self-supported basis if numbers and space permit. Local support is available for at most 15-20 participants.
For additional information on each of the courses, please see http://www.nucleartalent.org. Prior to the TALENT course, the ECT* organizes a Doctoral Training program on Microscopic Theories of Nuclear Structure, Dynamics and Electroweak Currents from June 12 to June 30, 2017. The doctoral training program can be combined with the TALENT course. Applicants interested in attending the doctoral training program can find more information at http://ectstar.eu/node/2238.
Contribution by Morten Hjorth-Jensen morten.hjorth-jensen@fys.uio.no (MSU & University of Oslo)

f. Successful initial test of the EMMA spectrometer at TRIUMF

The Electromagnetic Mass Analyser (EMMA) has been successfully tested with a heavy ion beam during a run that took place in December 2016 at TRIUMF (Canada's national laboratory for nuclear and particle physics). EMMA is a vacuum-mode recoil mass spectrometer designed to disperse the products of nuclear reactions according to their mass/charge (m/q) ratio. It is intended for 0° operation, allowing for the study of weak reaction channels within the cone of elastically scattered beam, and has the ability to isolate exotic unstable nuclei for further study at the focal plane.
During the test ^{36}Ar was impinged on gold target at 80 MeV and the spectrometer was set to transmit various charge states of both the scattered beam and backscattered ^{197}Au emerging from the target. The m/q dispersion of these charge states, as measured by a PGAC (Parallel Grid Avalanche Counter) installed at the focal plane, matched exactly with ion optical calculations used to design the spectrometer.

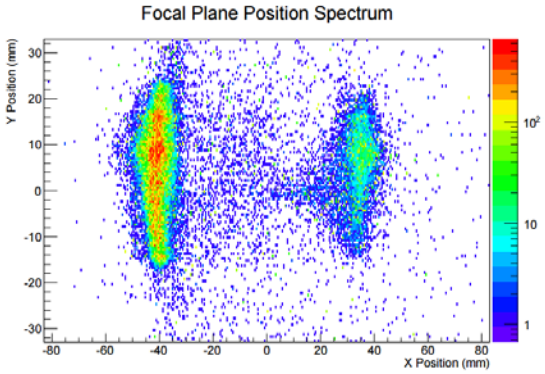

Figure 1: Focal plane position spectrum showing two loci corresponding to the 14+ and 13+ charge states of ^{36}Ar.

According to EMMA Principal Investigator Dr Barry Davids, "After much hard work by many people, the first heavy ion beam test of EMMA was an unqualified success, demonstrating its angular and energy focussing, m/q dispersion, and beam suppression capabilities. Much of the credit for this successful test is due to STFC-supported PhD student Matt Williams of the University of York who is jointly supervised by Prof Brian Fulton & myself"
This year will commence with extensive testing with an alpha source and accelerated heavy ions to accurately determine the acceptances and resolution of EMMA. Preparations for installing the TIGRESS γ-ray detector array in front of EMMA are underway and it is anticipated that the two spectrometers will be used together in first experiments in 2018. Further information on EMMA's capabilities is available at http://davids.triumf.ca/emma.htm and those interested in using it are encouraged to contact Dr Davids or Prof Fulton.
Contribution by Matt Williams mwilliams@triumf.ca (TRIUMF)

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3. Outreach Activity

Inspiring the Future – Employer Speed Networking event

On 9th January Chantal Nobs was invited to Woking High School to participate in an employer speed networking event, along with a host of people from other professions from British Airways stewardess to HSBC manager. On the day, Chantal met with 25 year 9 students to discuss why she decided to do a PhD in Nuclear Physics and what kind of jobs she hopes to get following her PhD. This event was organised through 'Inspiring the Future' http://www.inspiringthefuture.org/ a charity project connecting schools and colleges with employers and students in further education.
Contribution by Chantal Nobs c.nobs@brighton.ac.uk (Brighton)

GCSE talk at The Bishop of Winchester Academy

On the 18th January Chantal visited The Bishop of Winchester Academy to talk to 60 year 11 GCSE students about her PhD research project, investigating the structure of ^{102}Y, and her journey from GCSE to PhD.

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

Binding Blocks Update:
Stargazing Live, Tim Peake Principia Public Day, and future Physics Education Journal articles.

On the 13th January, Binding Blocks was exhibiting at the Stargazing Live Event at St Peter's School York for the second year running, alongside development of further engagement activities with A level students. 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, green fission, pink important medical isotopes, 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.

Approximately 400 visitors composed of families, school children and the general public were present for a Stargazing Live evening held at St Olave's and St Peter's Schools in York, where the Binding Blocks full chart was part of an exhibition alongside the University of York Physics Department, the IOP and many others. The exhibition focussed on space and stars in line with the open lecture of the evening delivered by Doctor Carolin Crawford titled "The Science and Beauty of Nebulae". The chart was well received and almost completed in its entirety by enthusiastic visitors in 2 and a half hours. Along with this recent event the chart was featured in the public day activities on 6th November 2016 as part of Tim Peake's Principia Mission visit to the University of York. Over the course of the day ~2000 visitors aided in successfully building the full chart (a few times over in fact leading to the team deconstructing sections occasionally).

The team is currently in the process of organising several large events around the Yorkshire region, including a GCSE multi-school event and an A-Level multi-school event in the next few months. A visit to York College is expected where ~80 A-Level students will have a day of activities based on Nuclear Physics and around the LEGO Nuclear Chart. In June, a large Nuclear Masterclass of a similar nature is being held at the University of York but with many visiting students from the surrounding schools. Finally, the team is preparing activity plans to aid teachers in integrating the visiting LEGO chart into Nuclear Physics lessons on topics such as fission, fusion and medical physics to be published in Journal Physics Education.

The project has its own 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 Ryan Davies
rad531@york.ac.uk (York)

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4. Media Interactions