UK Nuclear Activity

October 2015 Issue 28

In this issue,

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

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1. Nuclear Physics Publications for October*

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 92, 034330 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.034330
Widths of low-lying nucleon resonances in light nuclei in the source-term approach
N. K. Timofeyuk
*Published 30 September 2015

Appl. Radiat. Isot., 104, 203 (2015) http://www.sciencedirect.com/science/article/pii/S0969804315300828
The half-life of ^{227}Th by direct and indirect measurements
S.M. Collins[a,*], S. Pommé[b], S.M. Jerome[a], K.M. Ferreira[a], P.H. Regan[a,c], A.K. Pearce[a]
Published October 2015

Nature Physics 11, 811-814 (2015) http://www.nature.com/nphys/journal/v11/n10/full/nphys3432.html
Precision measurement of the mass difference between light nuclei and anti-nuclei
ALICE Collaboration, UK Authors: M. Borri, R. C. Lemmon, D. Alexandre, L. S. Barnby, D. Evans, L. D. Hanratty, P. G. Jones, A. Jusko, M. Krivda, G. R. Lee, R. Lietava, O. Villalobos Baillie, M. Chartier, M. A. S. Figueredo, J. Norman, R. Romita
Published October 2015

NIM B, 360, 97 (2015) http://www.sciencedirect.com/science/article/pii/S0168583X15007429
X-ray production with heavy post-accelerated radioactive-ion beams in the lead region of interest for Coulomb-excitation measurements
N. Bree[a], K. Wrzosek-Lipska[a,b], P.A. Butler[c], L.P. Gaffney[a,c], T. Grahn[d,e], M. Huyse[a], N. Kesteloot[a,f], J. Pakarinen[d,e],

*Also including missed publications from previous months.

A. Petts[c], P. Van Duppen[a], N. Warr[g]
Published 1 October 2015

Phys. Lett. B, 749, 68 (2015) http://www.sciencedirect.com/science/article/pii/S037026931500564X
Measurement of charged jet production cross sections and nuclear modification 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, 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 7 October 2015

Phys. Rev. C 92, 041302(R) (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.041302
New findings on structure and production of ^{10}He from ^{11}Li with the (d,^{3}He) reaction
A. Matta[1,2], D. Beaumel[1], H. Otsu[3], V. Lapoux[4], N. K. Timofeyuk[2], N. Aoi[3], M. Assié[1], H. Baba[3], S. Boissinot[4], R. J. Chen[3], F. Delaunay[5], N. de Sereville[1], S. Franchoo[1], P. Gangnant[6], J. Gibelin[5], F. Hammache[1], Ch. Houarner[6], N. Imai[7], N. Kobayashi[8], T. Kubo[3], Y. Kondo[8], Y. Kawada[8], L. H. Khiem[9],M. Kurata-Nishimura[3], E. A. Kuzmin[13], J. Lee[3], J. F. Libin[6], T. Motobayashi[3], T. Nakamura[8], L. Nalpas[4],E. Yu. Nikolskii[3,13], A. Obertelli[4], E. C. Pollacco[4], E. Rindel[1], Ph. Rosier[1], F. Saillant[6], T. Sako[8], H. Sakurai[3], A. M. Sánchez-Benítez[10,11], J-A. Scarpaci[1], I. Stefan[1], D. Suzuki[1], K. Takahashi[8], M. Takechi[3], S. Takeuchi[3], H. Wang[3], R. Wolski[12], and K. Yoneda[3]
Published 8 October 2015

Phys. Rev. C 92, 044308 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.044308
Spectroscopy of neutron-rich ^{34,35,36,37,38}P populated in binary grazing reactions
R. Chapman[1,*], A. Hodsdon[1], M. Bouhelal[2], F. Haas[3], X. Liang[1], F. Azaiez[4], Z. M. Wang[1], B. R. Behera[5], M. Burns[1], E. Caurier[3], L. Corradi[5], D. Curien[3], A. N. Deacon[6], Zs. Dombrádi[7], E. Farnea[8], E. Fioretto[5], A. Gadea[5], F. Ibrahim[4], A. Jungclaus[9], K. Keyes[1], V. Kumar[1], S. Lunardi[8], N. Mărginean[5,10],G. Montagnoli[8], D. R. Napoli[5], F. Nowacki[3], J. Ollier[1,11], D. O'Donnell[1,12], A. Papenberg[1], G. Pollarolo[13], M.-D. Salsac[14], F. Scarlassara[8], J. F. Smith[1], K. M. Spohr[1], M. Stanoiu[10], A. M. Stefanini[5],S. Szilner[5,15], M. Trotta[5], and D. Verney[4]
Published 9 October 2015

NIM A, 797, 77 (2015) http://www.sciencedirect.com/science/article/pii/S0168900215007913
A comparison of digital zero-crossing and charge-comparison methods for neutron/γ-ray discrimination with liquid scintillation detectors
M. Nakhostin
Published 11 October 2015

Phys. Rev. C 92, 044608 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.044608
Simultaneous analysis of the elastic scattering and breakup channel for the reaction ^{11}Li+^{208}Pb at energies near the Coulomb barrier
J. P. Fernández-García[1,2,3,*], M. Cubero[4,5], L. Acosta[3,6], M. Alcorta[7], M. A. G. Alvarez[8], M. J. G. Borge[4],L. Buchmann[7], C. A. Diget[9], H. A. Falou[10], B. Fulton[9], H. O. U. Fynbo[11], D. Galaviz[12], J. Gómez-Camacho[1,2], R. Kanungo[10], J. A. Lay[1,13], M. Madurga[4], I. Martel[14], A. M. Moro[1], I. Mukha[15], T. Nilsson[16], M. Rodríguez-Gallardo[1], A. M. Sánchez-Benítez[12,14], A. Shotter[17], O. Tengblad[4], and P. Walden[7]
Published 15 October 2015

Phys. Rev. Lett. 115, 172501 (2015) http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.115.172501
$^{37}_{97}Rb_{60}$: The Cornerstone of the Region of Deformation around A∼100
C. Sotty[1,2], M. Zielińska[3,4], G. Georgiev[1,*], D. L. Balabanski[5], A. E. Stuchbery[6], A. Blazhev[7], N. Bree[2],R. Chevrier[8], S. Das Gupta[9,†], J. M. Daugas[8], T. Davinson[10], H. De Witte[2], J. Diriken[2,11], L. P. Gaffney[2,12,‡], K. Geibel[7], K. Hadyńska-Klęk[3], F. G. Kondev[13], J. Konki[14,15,16], T. Kröll[17], P. Morel[8], P. Napiorkowski[3], J. Pakarinen[14,15,16], P. Reiter[7], M. Scheck[17,‡], M. Seidlitz[7], B. Siebeck[7], G. Simpson[18],H. Törnqvist[14], N. Warr[7], and F. Wenander[14]
Published 20 October 2015

Phys. Rev. C 92, 044319 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.044319
Spectroscopy of the neutron-rich actinide nucleus ^{240}U following multinucleon-transfer reactions
B. Birkenbach[1,*], A. Vogt[1], K. Geibel[1], F. Recchia[2,3], P. Reiter[1], J. J. Valiente-Dobón[4], D. Bazzacco[3], M. Bowry[5], A. Bracco[6], B. Bruyneel[7], L. Corradi[4], F. C. L. Crespi[6], G. de Angelis[4], P. Désesquelles[8], J. Eberth[1], E. Farnea[3], E. Fioretto[4], A. Gadea[9], A. Gengelbach[10], A. Giaz[6], A. Görgen[11,12], A. Gottardo[4],J. Grebosz[13], H. Hess[1], P. R. John[2,3], J. Jolie[1], D. S. Judson[14], A. Jungclaus[15], W. Korten[12], S. Lenzi[2],S. Leoni[6], S. Lunardi[2,3], R. Menegazzo[3], D. Mengoni[2,3,16], C. Michelagnoli[2,3,†], T. Mijatović[17], G. Montagnoli[2,3], D. Montanari[2,3,‡], D. Napoli[4], L. Pellegri[6], G.

Pollarolo[18], A. Pullia[6], B. Quintana[19], F. Radeck[1], D. Rosso[4], E. Şahin[4,§], M. D. Salsac[12], F. Scarlassara[2,3], P.-A. Söderström[20,‖], A. M. Stefanini[4], T. Steinbach[1], O. Stezowski[21], S. Szilner[17], B. Szpak[13], Ch. Theisen[12], C. Ur[3], V. Vandone[6], and A. Wiens[1]
Published 21 October 2015

Phys. Rev. C 92, 044321 (2015) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.92.044321
Shapes of ^{192,190}Pb ground states from β-decay studies using the total-absorption technique
M. E. Estévez Aguado, A. Algora*, J. Agramunt, B. Rubio, J. L. Taín, D. Jordán, L. M. Fraile, M. Csatlós, L. Csige, Zs. Dombrádi, A. Krasznahorkay, P. Sarriguren, M. J. G. Borge, J. A. Briz, O. Tengblad, F. Molina, V. N. Fedosseev, B. A. Marsh, P. L. Molkanov, M. D. Seliverstov, K. Burkard and W. Hüller
Published 21 October 2015

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2. News to Report

a. First UK Nuclear Theory get-together to be held in Manchester. Following the start of a new theory group at the University of York, the low-energy nuclear theory community in the UK is now active on a broad spectrum of exciting topics. These range from the structure of the nucleon and the nature of the nuclear interaction, to the development of ab-initio and mean-field techniques for exotic isotopes, all the way to infinite and nucleonic and neutron star matter. This adds to the long standing UK expertise in studying nuclear reactions.
A get-together will be held on 4-5 November 2015 to discuss the current research being pursued in the UK and the status of the field, as well as to foster new collaborations at the national level. Talks are public, as always, and everyone who is interested in low-energy nuclear physics is welcome to participate! More info can be found on the meeting webpage at
http://personal.ph.surrey.ac.uk/~cb0023/uktheory/uktheory/"
Contribution by Carlo Barbieri c.barbieri@surrey.ac.uk *(Surrey).*

b. IOP Nuclear Physics Group Committee. The membership of the IOP Nuclear Physics Group Committee has recently changed. The members of the new committee are:
Tzany Kokalova Wheldon (Chair) - Birmingham
Laura Harkness-Brennan - Liverpool
Chris Rees - Magnox
Bryan McKinnon - Glasgow
Kieran Flanagan - Manchester
Paul Stevenson - Surrey
Geoff Vaughan (ex officio as chair of the IOP Nuclear Industry Group)
Marc Labiche – Daresbury
Contribution by Bryan McKinnon *Bryan.McKinnon@glasgow.ac.uk (Glasgow).*

c. Report on NUPECC meeting, GANIL, 9-10 October. NuPECC, the Nuclear Physics European Collaboration Committee, held its 84th Meeting at the GANIL laboratory, Caen, on 9-10 October. The format of the meeting includes a morning session devoted to the ongoing research activities in the host country, followed by an afternoon and following morning to cover NuPECC business.
Welcome. GANIL & SPIRAL2. The meeting began with a welcome from Florent Staley, Director of GANIL. Being hosted at GANIL, the meeting was very interested in the progress of SPIRAL2. Phase 1 is now well underway, and during the construction phase the plan is to be able to continue to deliver around 4-5 months of usable beam each year. First beams from SPIRIAL2 itself are hoped for in the middle of next year. Phase 2 of the new facility is still postponed, and it was emphasised that further progress will require medium and long term plans that work in collaboration with other major European laboratories. This is what is becoming called "Ganil2025", and the process for developing this is to be concluded at the Colloque next week. One of the main developments will be an increased emphasis on nuclear physics for health, and indeed, a proton therapy facility presently under construction at GANIL is to be a prototype for a carbon-12 therapy facility. The legal status of GANIL ceases at the end of 2015, but the funding agencies have already agreed to renew the status for a further 30 years.
Nuclear physics research in France. Following this introduction and discussion of GANIL/SPIRAL2, there were presentations by Patricia Roussel-Chomaz and Dominique Mueller describing the overall landscape for nuclear physics research in France. Both the Physical Sciences Division of the CEA (Alternative Energies and Atomic Energy

Commission), and the IN2P3 (National Institute of Nuclear and Particle Physics) which is one of ten institutes within the CNRS (Centre National de la Recherche Scientifique) fund and support nuclear physics research. Reporting of recent science progress, Navin Alahari gave details of nuclear structure work, especially with a view to activity at GANIL, Bertrand Blank presented recent highlights of physics with low energy radioactive beams, Remi Bougault reviewed results in nuclear dynamics and Elias Khan provided an overview of French nuclear theory.
The final talk of this session, Daniel Guerreau, was on hadron therapy in France, and the ARCHADE (Advanced Resource Center for Hadrontherapy in Europe) project in particular.

The future of NuPECC. The NuPECC itself meeting began with an update in the status of the ESF, and NuPECCs possible future role. Jean Claude Worms reported that the June Governing Council approved plan for ESF to evolve into a science-services based organisation that will include 5 export boards, one of which is NuPECC. The final go-ahead for this structure still needs to be ratified, and there is still some uncertainty over exactly whether the new organisation will retain the ESF name. Further major aspects of the new organisation, including the full list of supporting nations and the cost-model, are also still being discussed.

ECT*. Judith McGovern (Manchester) steps down from the centre's board in January 2016, with Gert Aarts (Swansea) joining the committee. The last 12 months have seen better than usual participation and leadership of ECT* activities.

FAIR. Boris Sharkov reported on the Modularised Start Version (MSV), describing the planning for proceeding with construction. The MSV has four pillars: M0 which is the SIS100 tunnel, M1 the Compressed Baryonic Matter (CBM) experiment, and the Atomic, Plasma Physics and Applications (APPA) site, M2 features the Super-FRS for NUSTAR. M3 then includes PANDA and further work on APPA and NUSTAR. The Scientific Councils have reconfirmed their support for the 4 pillars and state that they consider the ordering of the pillars by the International Review committee (that was chaired by Rolf-Dieter Hauer) reflects resource loading rather than pure scientific merit. Overall there is a shortfall of some 350ME (in 2022 prices) but the strategy is to begin planning of the construction, setting up of civil contracts and procurement orders now. Interestingly, the MSV now included again several low energy nuclear structure and astrophysics aspects that had previously seen descoping. The hoped for schedule sees first beams in 2022 and a fully operational facility in 2025.
The SIS100 tunnel had been criticized for perhaps being over-designed. Karlheinz Langanke reported on a review that had considered this, finding that while marginal saving were possible, but the present design leaves open significant future options, thus concluding that the present SIS100 design is appropriate. Also reported were science highlights from recent GSI experiments in which the chemical behaviour of element 114 was determined.

NSF (Don Geesaman) In the US, the NSF's long range plan has been completed and will be announced next week. Likely components will be the completion of FRIB, building of an electron-ion collider, a commitment to a lead role in one or more neutrinoless double beta decay projects, more instrumentation and support for theory. While making the case for a strong and exciting future, it was emphasised that the roadmap retains realistic constant effort and budget constraints.

ENSAR2 Mushin Harakeh happily reported that the Horizon 2020 "European Nuclear Science and Applications Research 2" proposal has been funded, formally starting this month. A significant number of changes are required to the detailed tasks in the proposal, but not to the overall budget of 10ME. The proposal includes TNAs (10), JRAs (7), and NAs(12 → 8).

EURISOL-DF Marek Lewitowicz. The EURISOL Distributed Facility, a plan to realize a new radioactive ion beam facility and to upgrade existing ones, initially includes ISOLDE, SPIRAL2 and SPES, but is hoped to expand to include ISOL-MYRRHA, COPIN (Poland), ALTO and JYFL. The aim at present is to establish the DF on the 2018 ESFRI roadmap, with a single site EURISOL as a longer term plan. There is a EURISOL JRA in ENSAR2.
http://www.eurisol.org/eurisol_df.

NuPECC Long Range Plan. The final part of the meeting was a detailed discussion of candidate conveners and working group members for the next Long Range Plan. A significant number of UK based scientists are included. An additional NuPECC Strategy

Meeting has been scheduled in Darmstadt, January 16, 2016, that will review progress and confirm timescales for completion.

Contribution by Alexander Murphy
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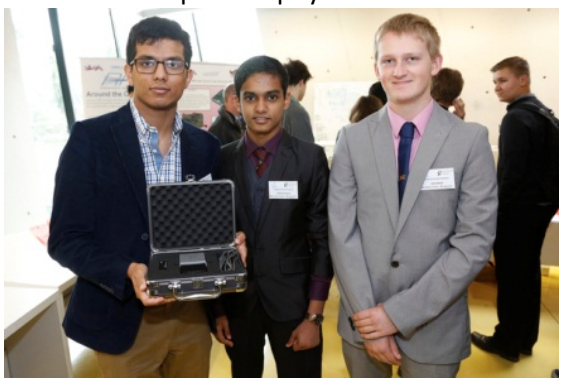
3. Outreach Activity

CERN@school Symposium

The second CERN@school symposium was held on the 16th September 2015 at Queen Mary University of London.
CERN@school runs a collaborative research programme for schools using 40 CERN@school detector kits – Timepix chips from the medipix collaboration at CERN – used in classrooms and in space (via the LUCID satellite experiment) to do research projects in nuclear and particle physics.



During the conference student talks and posters were given on a variety of topics including:

- RAY (radiation around you) project, where students are systematically measuring the properties of background radiation across the UK.
- RISE (Radiation In Soil) experiment, which aims to make a radiation map of the United Kingdom (and beyond!) by analysing soil samples with the CERN@school detectors.
- Anomalously high background radiation levels measured in the Elan Valley in Wales.

A new project was also unveiled: TimPix – as part of Tim Peake's Principia mission, will help monitor Peake radiation levels on board the International Space Station (ISS) with data from five Timepix detectors.
The key note talk was given by Prof Larry Pinsky from NASA on 'Past Results and Future Plans by NASA for Medipix Detectors in Space' and Dr Michael Campbell, head of the Medipix collaboration at CERN handed out the participation certificates and gave the ending address.

Contribution by Elizabeth Cunningham
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(STFC/Surrey)

Inspirational Physics

On 21st October Jim Al-Khalili and Elizabeth Cunningham took part in an 'Inspirational Physics' event at the University of Surrey for approximately 200 secondary school students. Jim spoke about Time travel in Einstein's Universe and Elizabeth gave a talk about nuclear astrophysics and careers in science. The other speakers were Maggie Aderin-Pocock (UCL) and Justin Read (Surrey).
Contribution by Elizabeth Cunningham
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4. Media Interactions

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