UK Nuclear Activity

May 2018 Issue 59

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 May*

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 97, 044324 (2018) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.97.044324
Investigating the large deformation of the $5/2^+$ isomeric state in ^{73}Zn: An indicator for triaxiality
X. F. Yang[1,2,*], Y. Tsunoda[3], C. Babcock[4], J. Billowes[5], M. L. Bissell[5], K. Blaum[6], B. Cheal[4], K. T. Flanagan[5,7], R. F. Garcia Ruiz[5], W. Gins[2], C. Gorges[8,9], L. K. Grob[10,9], H. Heylen[10], S. Kaufmann[9], M. Kowalska[10], J. Krämer[9], S. Malbrunot-Ettenauer[10], R. Neugart[6,8], G. Neyens[2,10], W. Nörtershäuser[9], T. Otsuka[11,3,12,2,13], J. Papuga[2], R. Sánchez[14], C. Wraith[4], L. Xie[5], and D. T. Yordanov[15]
*Published 30 April 2018

Phys. Rev. C 97, 054601 (2018) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.97.054601
Three-nucleon force contribution in the distorted-wave theory of (d,p) reactions
N. K. Timofeyuk
Published 2 May 2018

Phys. Rev. C 97, 055501 (2018) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.97.055501
Relativistic effects in *ab initio* electron-nucleus scattering
Noemi Rocco[1], Winfried Leidemann[2,3], Alessandro Lovato[3,4], and Giuseppina Orlandini[2,3]
Published 4 May 2018

MNRAS, sty1185 (2018) https://doi.org/10.1093/mnras/sty1185
Uncertainties in *s* −process nucleosynthesis in low mass stars determined from Monte Carlo variations
G Cescutti, R Hirschi, N Nishimura, J W den Hartogh, T Rauscher, A St J Murphy, S Cristallo
Published 5 May 2018

*Also including missed publications from previous months.

Edited by Elizabeth Cunningham, STFC Particle and Nuclear Physics Outreach Officer.
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Phys. Rev. C 97, 054308 (2018) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.97.054308
Algebraic diagrammatic construction formalism with three-body interactions
Francesco Raimondi and Carlo Barbieri
Published 8 May 2018

Physics Letters B, 780, 7 (2018) https://www.sciencedirect.com/science/article/pii/S0370269318301412
Search for collectivity with azimuthal J/ψ-hadron correlations in high multiplicity p–Pb collisions at $\sqrt{s_{NN}}$ = 5.02 and 8.16 TeV
ALICE Collaboration, UK Authors: H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, K. L. Graham, C. Hills, P. G. Jones, A. Jusko, M. Krivda, R. C. Lemmon, R. Lietava, S. W. Lindsay, J. Norman, O. Villalobos Baillie, E. Willsher, N. Zardoshti
Published 10 May 2018

Physics Letters B, 780, 372 (2018) https://www.sciencedirect.com/science/article/pii/S0370269318301977
Measurement of Z^0-boson production at large rapidities in Pb–Pb collisions at $\sqrt{s_{NN}}$ = 5.02 TeV
ALICE Collaboration, UK Authors: H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, K. L. Graham, C. Hills, J.P. Iddon, P. G. Jones, A. Jusko, M. Krivda, R. C. Lemmon, R. Lietava, S. W. Lindsay, J. Norman, O. Villalobos Baillie, E. Willsher, N. Zardoshti
Published 10 May 2018

NIMA 890, 142 (2018) https://www.sciencedirect.com/science/article/pii/S0168900218302110
Preparation and characterization of ^{33}S samples for ^{33}S(n,α)^{30}Si cross-section measurements at the n_TOF facility at CERN
J.Praena[1], F.J.Ferrer[2], W.Vollenberg[3], M.Sabaté-Gilarte[43], B.Fernández[2,4], J.García-López[2,4], I.Porras[1], J.M.Quesada[4], S.Altstadt[5], J.Andrzejewski[6], L.Audouin[7], V.Bécares[8], M.Barbagallo[9], F.Bečvář[10], F.Belloni[11], E.Berthoumieux[11], J.Billowes[12], V.Boccone[3], D.Bosnar[13], M.Brugger[3], F.Calviño[14], M.Calviani[3], D.Cano-Ott[8], C.Carrapiço[15], F.Cerutti[3], E.Chiaveri[3,11], M.Chin[3], N.Colonna[9], G.Cortés[14], M.A.Cortés-Giraldo[4], M.Diakaki[16], M.Dietz[17], C.Domingo-Pardo[18], R.Dressler[19], I.Durán[20], C.Eleftheriadis[21], A.Ferrari[3], K.Fraval[11], V.Furman[22], K.Göbel[5], M.B.Gómez-Hornillos[14], S.Ganesan[23], A.R.García[8], G.Giubrone[18], I.F.Gonçalves[15], E.González-Romero[8], A.Goverdovski[24], E.Griesmayer[25], C.Guerrero[3], F.Gunsing[11], T.Heftrich[5], A.Hernández-Prieto[3,14], J.Heyse[26], D.G.Jenkins[27], E.Jericha[25], F.Käppeler[28], Y.Kadi[3], D.Karadimos[16], T.Katabuchi[29], V.Ketlerov[24], V.Khryachkov[24], N.Kivel[19], P.Koehler[30], M.Kokkoris[16], J.Kroll[10], M.Krtička[10], C.Lampoudis[11], C.Langer[5], E.Leal-Cidoncha[20], C.Lederer[31], H.Leeb[25], L.S.Leong[7], J.Lerendegui-Marco[4], R.Losito[3], A.Mallick[23], A.Manousos[21], J.Marganiec[6], T.Martínez[8], C.Massimi[32,33], P.Mastinu[34], M.Mastromarco[9], E.Mendoza[8], A.Mengoni[35], P.M.Milazzo[36], F.Mingrone[32], M.Mirea[37], W.Mondelaers[26], C.Paradela[20], A.Pavlik[31], J.Perkowski[6], A.J.M.Plompen[26], T.Rauscher[38], R.Reifarth[5], A.Riego-Perez[14], M.Robles[20], C.Rubbia[3], J.A.Ryan[12], R.Sarmento[15], A.Saxena[23], P.Schillebeeckx[26], S.Schmidt[5], D.Schumann[19], P.Sedyshev[22], G.Tagliente[9], J.L.Tain[18], A.Tarifeño-Saldivia[18], D.Tarrío[20], L.Tassan-Got[7], A.Tsinganis[3], S.Valenta[10], G.Vannini[32,33], V.Variale[9], P.Vaz[15], A.Ventura[32], M.J.Vermeulen[27], V.Vlachoudis[3], R.Vlastou[16], A.Wallner[39], T.Ware[12], M.Weigand[5], C.Weiss[25], T.Wright[12], P.Žugec[13], The n_TOF Collaboration[1]
Published 11 May 2018

Phys. Rev. C 97, 055802 (2018) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.97.055802
Characterizing the astrophysical ***S*** factor for ^{12}C+^{12}C fusion with wave-packet dynamics
Alexis Diaz-Torres[1,*] and Michael Wiescher[2]
Published 14 May 2018

Phys. Rev. C 97, 054327 (2018) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.97.054327
Charge radii and electromagnetic moments of $^{195-211}$At
J. G. Cubiss[1,*], A. E. Barzakh[2], M. D. Seliverstov[1,2], A. N. Andreyev[1,3,4,5], B. Andel[6], S. Antalic[6], P. Ascher[7,†], D. Atanasov[7,‡], D. Beck[8], J. Bieroń[9], K. Blaum[7], Ch. Borgmann[7], M. Breitenfeldt[10], L. Capponi[4], T. E. Cocolios[5,10,11], T. Day Goodacre[5,11,§], X. Derkx[4,12], H. De Witte[10], J. Elseviers[10], D. V. Fedorov[2], V. N. Fedosseev[5], S. Fritzsche[13,14], L. P. Gaffney[10], S. George[7], L. Ghys[10,15], F. P. Heßberger[16,17], M. Huyse[10], N. Imai[5,18], Z. Kalaninová[6,19], D. Kisler[7], U. Köster[20], M. Kowalska[5], S. Kreim[5,7], J. F. W. Lane[4], V. Liberati[4], D. Lunney[21], K. M. Lynch[5,11], V. Manea[5,21], B. A. Marsh[5], S. Mitsuoka[3], P. L. Molkanov[2], Y. Nagame[3], D. Neidherr[8], K. Nishio[3], S. Ota[3], D. Pauwels[15], L. Popescu[15], D. Radulov[10], E. Rapisarda[5], J. P. Revill[22], M. Rosenbusch[23,‖], R. E. Rossel[5,24], S. Rothe[5,24], K. Sandhu[4], L. Schweikhard[23], S. Sels[10], V. L. Truesdale[1], C. Van Beveren[10], P. Van den Bergh[10], Y. Wakabayashi[3], P. Van Duppen[10], K. D. A. Wendt[24], F. Wienholtz[5,23], B. W. Whitmore[1], G. L. Wilson[1], R. N. Wolf[7,23,¶], and K. Zuber[25]
Published 29 May 2018

2. News to Report

a. Professor Jim Al-Khalili elected Fellow of the Royal Society

Content from Surrey News.

Renowned theoretical physicist and award-winning broadcaster, Professor Jim Al-Khalili, has been made a Fellow of the Royal Society. Announcing the honour today (Wednesday 9 May), the Royal Society recognised Professor Al-Khalili for his work on the neutron halo, as well as his dedicated service to public engagement. The highly prestigious Fellowship of the Royal Society is made up of the most eminent scientists, engineers and technologists from or working in the UK and the Commonwealth.

Professor Al-Khalili has been published widely in his field of nuclear reaction theory, contributing to our understanding of the structure of atomic nuclei. Along with this new honour from the Royal Society, he is a recipient of the Royal Society Michael Faraday medal, the Institute of Physics Kelvin Medal and the Stephen Hawking Medal. The Professor has also been awarded a number of fellowships including the EPSRC's Advanced Research Fellowship and Senior Media Fellowship.

Professor Al-Khalili is a regular fixture on the country's television screens, radio waves and book shelves – presenting programmes such as BBC4's Bafta nominated Chemistry: A Volatile History, Atom, The Beginning and End of the Universe and Gravity and Me. He also presents the long-running BBC Radio 4 programme, The Life Scientific. He has written eleven popular science books, which have been translated in to 26 languages – including Life on the Edge, a collaboration with Surrey colleague Johnjoe McFadden.

Professor Al-Khalili also received an OBE in 2007 for services to science.

Professor Max Lu, President and Vice-Chancellor of the University of Surrey, said: "The election of Professor Al-Khalili to the world's most prestigious academy is a strong testament to the excellence of his work and his tireless effort in promoting science to the public"

"On behalf of the University of Surrey, I congratulate Jim on this wonderful accolade."

Jim Al-Khalili, Professor of Physics and Professor of Engagement in Science at the University of Surrey, said: "I feel honoured and grateful to the Royal Society for electing me a Fellow of their organisation and I would like to thank my family, friends and colleagues for their support throughout the years."

Professor Michael Kearney, Provost of the University of Surrey, said: "It has been a pleasure to watch Jim grow his public engagement activities over the years to where he is undeniably one of the foremost science communicators of the day. This well-deserved honour is a wonderful recognition of an extremely talented physicist and I'm delighted for him."

The Royal Society is a self-governing Fellowship made up of the most eminent scientists, engineers and technologists from the UK and the Commonwealth. There are approximately 1,600 Fellows and Foreign Members, including around 80 Nobel Laureates. Each year up to 52 Fellows and up to 10 Foreign Members are elected from a group of around 700 candidates who are proposed by the existing Fellowship. Prominent recipients include, Isaac Newton, Charles Darwin, Stephen Hawking, Dorothy Hodgkin and Alan Turing.

b. Cosmic-ray muography

On the 13th & 14th May, Dr David Mahon and Profs. Ralf Kaiser & David Ireland of the University of Glasgow Nuclear Physics group (along with colleagues from the University of Florence and the National Nuclear Laboratory) hosted a prestigious Royal Society Theo Murphy Scientific Meeting on Cosmic-ray Muography at Chicheley Hall in Buckinghamshire.

This was the first time the leading companies and academic research groups in the field has been brought together. This included University of Glasgow spin-out Lynkeos Technology, which is led by Prof Kaiser and Dr Mahon. The meeting discussed the latest developments in this imaging field, which uses naturally-occurring background radiation in the form of cosmic-ray muons to inspect the contents of complex challenging structures

including nuclear waste containers, pyramids, volcanoes and underground cavities. The proceedings for this meeting will be published in a special edition of the Philosophical Transactions of the Royal Society A and will be guest edited by the organising committee.
A link to the meeting is shown below:
https://royalsociety.org/science-events-and-lectures/2018/05/cosmic-ray-muography/
Contribution by David Ireland
David.Ireland@glasgow.ac.uk (Glasgow)

c. Jets do the splits at Quark Matter 2018
The 27th International Conference on Ultrarelativistic Nucleus-Nucleus Collisions, otherwise known as Quark Matter 2018, was held in Venice between the 13th and 19th of May. Birmingham Ph.D. student, Harry Andrews, gave a talk entitled "*Exploring the Phase Space of Jet Splittings at ALICE using Grooming and Recursive Techniques*" that was nominated for best parallel talk at the conference.
Translating the title of Harry's talk into more everyday language, he has been looking at ways of characterising the distributions of hadrons in jets, to find robust observables that permit a meaningful comparison between proton-proton collisions and heavy-ion collisions. Jets are interesting objects to study because they provide sensitivity to processes occurring at the partonic level. What he has found is that jets with a dominant two-prong structure are more likely to be suppressed in heavy-ion collisions; the effect being stronger the wider the angular separation between the two sub-jets. This result generated some excitement at the conference because it may be related to the phenomenon of coherence in the quark-gluon plasma. In this context, coherence length is the separation above which two progenitor partons become resolved by the medium and radiate independently.
Harry is now concentrating on preparing his findings for publication later this year.
Contribution by Peter Jones
p.g.jones@bham.ac.uk (Birmingham)

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3. Outreach Activity

IOP Public Lecture
On 9th May Elizabeth Cunningham gave an IOP South Central Branch lecture on Radiation Protection: How to survive a journey to Mars to an audience of 75 people. The talk detailed the high tech and low tech solutions NASA and others are researching to get astronauts safely to Mars.

Pint of Science
On 15th May 3 physicists from the University of Surrey walked into a bar and entertained a sold out audience with a journey to the centre of the atom via a high flying space balloon and a supernova! Dan Doherty, Caroline Shenton-Taylor and Heather Campbell managed to make nuclear physics laboratories, high altitude experiments and cosmology hilarious – for one night only!

Contributions by Elizabeth Cunningham
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(STFC/Surrey)

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4. Media Interactions
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