UK Nuclear Activity

November 2020 Issue 89

In this issue,

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

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1. Nuclear Physics Publications for November (also includes missed publications from previous months)

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 **102**, 045806 **(Editor's Pick)**
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.045806
Level structure of ^{31}S via ^{32}S(p,d)^{31}S
K. Setoodehnia[1,*], A. A. Chen[1], J. Chen[1,†], J. A. Clark[2], C. M. Deibel[3,2,‡], J. Hendriks[4], D. Kahl[5,6], W. N. Lennard[4], P. D. Parker[7], D. Seiler[8], and C. Wrede[9,10]
Published 14 October 2020

Nature **587**, pages210–213(2020)
https://www.nature.com/articles/s41586-020-2878-4
The baryon density of the Universe from an improved rate of deuterium burning
V. Mossa, K. Stöckel, F. Cavanna, F. Ferraro, M. Aliotta, F. Barile, D. Bemmerer, A. Best, A. Boeltzig, C. Broggini, C. G. Bruno, A. Caciolli, T. Chillery, G. F. Ciani, P. Corvisiero, L. Csedreki, T. Davinson, R. Depalo, A. Di Leva, Z. Elekes, E. M. Fiore, A. Formicola, Zs. Fülöp, G. Gervino, A. Guglielmetti, C. Gustavino, G. Gyürky, G. Imbriani, M. Junker, A. Kievsky, I. Kochanek, M. Lugaro, L. E. Marcucci, G. Mangano, P. Marigo, E. Masha, R. Menegazzo, F. R. Pantaleo, V. Paticchio, R. Perrino, D. Piatti, O. Pisanti, P. Prati, L. Schiavulli, O. Straniero, T. Szücs, M. P. Takács, D. Trezzi, M. Viviani & S. Zavatarelli
Published 11 November 2020

Phys. Rev. Lett. **125**, 192501
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.125.192501
Competition between Allowed and First-Forbidden β Decay: The Case of 208Hg→208Tl
R. J. Carroll[1], Zs. Podolyák[1,2], T. Berry[1], H. Grawe[3], T. Alexander[1], A. N. Andreyev[4,22], S. Ansari[5], M. J. G. Borge[6], M. Brunet[1], J. R. Creswell[7], L. M. Fraile[8], C. Fahlander[9], H. O. U. Fynbo[10], E. R. Gamba[11], W. Gelletly[1], R.-B. Gerst[5], M. Górska[3], A. Gredley[7], P. T. Greenlees[12,13], L. J. Harkness-Brennan[7], M. Huyse[14], S. M. Judge[15], D. S. Judson[7], J. Konki[12,13], J. Kurcewicz[6], I. Kuti[16], S. Lalkovski[1], I. H. Lazarus[17], R. Lică[6,18], M. Lund[10], M. Madurga[6,23], N. Marginean[18], R. Marginean[18], I. Marroquin[19], C. Mihai[18], R. E. Mihai[18], E. Nácher[19], A. Negret[18], C. Nita[18,11], S. Pascu[18], R. D. Page[7], Z. Patel[1], A. Perea[19], J. Phrompao[20], M. Piersa[21], V. Pucknell[17], P. Rahkila[12,13], E. Rapisarda[6], P. H. Regan[1,15], F. Rotaru[18], M. Rudigier[1], C. M. Shand[1], R. Shearman[1,15], S. Stegemann[5], T. Stora[6], Ch. Sotty[14,18], O. Tengblad[19], P. Van Duppen[14], V. Vedia[8], R. Wadsworth[4], P. M. Walker[1], N. Warr[5], F. Wearing[7], and H. De Witte[14]
Published 2 November 2020

Phys. Rev. Lett. **125**, 192505
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.125.192505
Properties of 187Ta Revealed through Isomeric Decay
P. M. Walker[1,*], Y. Hirayama[2], G. J. Lane[3], H. Watanabe[4,5], G. D. Dracoulis[3], M. Ahmed[2,6], M. Brunet[1], T. Hashimoto[7], S. Ishizawa[5,8,2], F. G. Kondev[9], Yu. A. Litvinov[10], H. Miyatake[2], J. Y. Moon[7], M. Mukai[6,2,5], T. Niwase[2,5,11], J. H. Park[7], Zs. Podolyák[1], M. Rosenbusch[2], P. Schury[2], M. Wada[2,6], X. Y. Watanabe[2], W. Y. Liang[12], and F. R. Xu[12]
Published 6 November 2020

Phys. Rev. C **102**, 052802(R)
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.052802
Underground experimental study finds no evidence of low-energy resonance in the 6Li(p,γ)7Be reaction
D. Piatti[1], T. Chillery[2], R. Depalo[1,*], M. Aliotta[2], D. Bemmerer[3], A. Best[4], A. Boeltzig[5], C. Broggini[6], C. G. Bruno[2], A. Caciolli[1], F. Cavanna[7], G. F. Ciani[5], P. Corvisiero[7], L. Csedreki[5], T. Davinson[2], A. Di Leva[4], Z. Elekes[8], F. Ferraro[7], E. M. Fiore[9], A. Formicola[10], Zs. Fülöp[8], G. Gervino[11], A. Gnech[12], A. Guglielmetti[13], C. Gustavino[14], Gy. Gyürky[8], G. Imbriani[4], M. Junker[10], I. Kochanek[10], M. Lugaro[15], L. E. Marcucci[16], P. Marigo[17], E. Masha[13], R. Menegazzo[6], V. Mossa[9], F. R. Pantaleo[9], V. Paticchio[18], R. Perrino[18], P. Prati[7], L. Schiavulli[9], K. Stöckel[19], O. Straniero[20], T. Szücs[3], M. P. Takács[19], and S. Zavatarelli[7] (LUNA Collaboration)
Published 10 November 2020

Phys. Rev. C **102**, 051301(R)
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.051301
Doubly-magic character of 132Sn studied via electromagnetic moments of 133Sn
L. V. Rodríguez[1,2,*], D. L. Balabanski[3], M. L. Bissell[4], K. Blaum[2], B. Cheal[5], G. De Gregorio[6,7], J. Ekman[8], R. F. Garcia Ruiz[9,†], A. Gargano[6], G. Georgiev[10], W. Gins[11,‡], C. Gorges[12,§], H. Heylen[2,9,11], A. Kanellakopoulos[11], S. Kaufmann[12], V. Lagaki[9,13], S. Lechner[9,14], B. Maaß[12], S. Malbrunot-Ettenauer[9], R. Neugart[15,2], G. Neyens[9,11], W. Nörtershäuser[12], S. Sailer[16], R. Sánchez[17], S. Schmidt[12], L. Wehner[15], C. Wraith[5], L. Xie[4], Z. Y. Xu[11,‖], X. F. Yang[11,18], and D. T. Yordanov[1,9]
Published 9 November 2020

Phys. Rev. C **102**, 054304
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054304
Quadrupole deformation of 130Xe measured in a Coulomb-excitation experiment
L. Morrison[1], K. Hadyńska-Klęk[2,1], Zs. Podolyák[1], D. T. Doherty[1], L. P. Gaffney[3,4], L. Kaya[5], L. Próchniak[2], J. Samorajczyk-Pyśk[2], J. Srebrny[2], T. Berry[1], A. Boukhari[6], M. Brunet[1], R. Canavan[1,7], R. Catherall[4], S. J. Colosimo[3], J. G. Cubiss[8], H. De Witte[9], Ch. Fransen[5], E. Giannopoulos[10,4], H. Hess[5], T. Kröll[11], N. Lalović[12], B. Marsh[4], Y. Martinez Palenzuela[4,9], P. J. Napiorkowski[2], G. O'Neill[13,14], J. Pakarinen[10,15], J. P. Ramos[16,4], P. Reiter[5], J. A. Rodriguez[4], D. Rosiak[5], S. Rothe[4], M. Rudigier[1], M. Siciliano[17,18], J. Snäll[12], P. Spagnoletti[19], S. Thiel[5], N. Warr[5], F. Wenander[4], R. Zidarova[20], and M. Zielińska[17]
Published 3 November 2020

Phys. Rev. C **102**, 054306
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054306
Convergence of electric quadrupole rotational invariants from the nuclear shell model
J. Henderson[*]
Published 4 November 2020

Phys. Rev. C **102**, 054314
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054314
Spectroscopic study of 47Ca from the β− decay of 47K
J. K. Smith[1,*], A. B. Garnsworthy[1], J. L. Pore[2,†], C. Andreoiu[2], A. D. MacLean[3], A. Chester[1,‡], Z. Beadle[4], G. C. Ball[1], P. C. Bender[1,§], V. Bildstein[3], R. Braid[5], A. Diaz Varela[3], R. Dunlop[3], L. J. Evitts[1,6,‖], P. E. Garrett[3], G. Hackman[1], S. V. Ilyushkin[5], B. Jigmeddorj[3,¶], K. Kuhn[5], A. T. Laffoley[3], K. G. Leach[1,#], D. Miller[1,**], W. J. Mills[1], W. Moore[5], M. Moukaddam[1,††], B. Olaizola[3,‡‡], E. E. Peters[7], A. J. Radich[3], E. T. Rand[3], F. Sarazin[5], C. E. Svensson[3], S. J. Williams[8,§§], and S. W. Yates[7,9]
Published 11 November 2020

Phys. Rev. C **102**, 054318
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054318
Structure of 30Mg explored via in-beam γ-ray spectroscopy
N. Kitamura[1,*], K. Wimmer[2,3,4,†], N. Shimizu[1], V. M. Bader[4,5], C. Bancroft[3], D. Barofsky[3], T. Baugher[4,5], D. Bazin[4], J. S. Berryman[4], V. Bildstein[6], A. Gade[4,5], N. Imai[1], T. Kröll[7], C. Langer[4], J. Lloyd[3], E. Lunderberg[4,5], G. Perdikakis[3,4], F. Recchia[4], T. Redpath[3], S. Saenz[3], D. Smalley[4], S. R. Stroberg[4,5], J. A. Tostevin[8], N. Tsunoda[1], Y. Utsuno[9,1], D. Weisshaar[4], and A. Westerberg[3]
Published 12 November 2020

Phys. Rev. C **102**, 054322
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054322
Lifetime measurements in the odd−A nucleus 177Hf
L. Knafla[1,*], P. Alexa[2], U. Köster[3], G. Thiamova[4], J.-M. Régis[1], J. Jolie[1], A. Blanc[3], A. M. Bruce[5], A. Esmaylzadeh[1], L. M. Fraile[6], G. de France[7], G. Häfner[1,8], S. Ilieva[9], M. Jentschel[3], V. Karayonchev[1], W. Korten[10], T. Kröll[9], S. Lalkovski[11], S. Leoni[12], H. Mach[13], N. Mărginean[14], P. Mutti[3], G. Pascovici[14], V. Paziy[6], Zs. Podolyák[15], P. H. Regan[15,16], O. J. Roberts[5], N. Saed-Samii[1], G. S. Simpson[17,18], J. F. Smith[18], T. Soldner[3], C. Townsley[15], C. A. Ur[19], W. Urban[3,20], A. Vancraeyenest[4], and N. Warr[1]
Published 16 November 2020

Phys. Rev. C **102**, 054325
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054325
High-precision branching ratio measurement and spin assignment implications for 62Ga superallowed β decay
A. D. MacLean[1,*], A. T. Laffoley[1,†], C. E. Svensson[1], G. C. Ball[2], J. R. Leslie[3], C. Andreoiu[4], A. Babu[2], S. S. Bhattacharjee[2], H. Bidaman[1], V. Bildstein[1], C. Burbadge[1], M. Bowry[2,‡], C. Cheng[2], D. S. Cross[4], A. Diaz-Varela[1], I. Dillmann[2,5], M. R. Dunlop[1], R. Dunlop[1], L. J. Evitts[2,6,§], P. Finlay[7,‖], S. Gillespie[2], A. B. Garnsworthy[2], P. E. Garrett[1], E. Gopaul[2], C. J. Griffin[2], G. F. Grinyer[8], G. Hackman[2], J. Henderson[2,¶], B. Jigmeddorj[1,#], K. G. Leach[9], E. Kassanda[1], J. McAfee[2,6], M. Moukaddam[2,**], C. Natzke[2,9], S. Nittala[2], B. Olaizola[2], J. Park[2,††], C. Paxman[2,6], J. L. Pore[4,‡‡], C. Porzio[2,10], A. J. Radich[1], P. Ruotsalainen[2,§§], Y. Saito[2,11], S. Sharma[8], J. Smallcombe[2,‖‖], J. K. Smith[2,¶¶], R. Sultana[2], J. Turko[1], J. Williams[2], D. Yates[2,11], and T. Zidar[1]
Published 19 November 2020

Phys. Rev. C **102**, 054607
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054607
Measurement and analysis of the isomeric cross section ratios for the 94Tc nucleus
G. S. Li[1,2], Y. D. Fang[1,*], X. H. Zhou[1,†], A. Diaz-Torres[3], A. Rohilla[1], M. L. Liu[1], N. T. Zhang[1], Y. H. Zhang[1], J. G. Wang[1], B. S. Gao[1], Y. H. Qiang[1], S. Guo[1], S. C. Wang[1], Y. Zheng[1], J. Lubian[4], and H. O. Soler[4]
Published 12 November 2020

Phys. Rev. C **102**, 054609
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054609
Population of lead isotopes in binary reactions using a 94Rb radioactive beam
P. Čolović[1], S. Szilner[1,*], A. Illana[2], J. J. Valiente-Dobón[2,†], L. Corradi[2], G. Pollarolo[3], T. Mijatović[1], A. Goasduff[2,4], G. Benzoni[5], M. J. G. Borge[6], A. Boso[4], A. Boukhari[7], S. Ceruti[5], J. G. Cubiss[8], G. de Angelis[2], H. De Witte[9], E. Fioretto[2], Ch. Fransen[10], F. Galtarossa[2,11], L. P. Gaffney[12,13], E. Giannopoulos[12,14], H. Hess[10], M. L. Jurado-Gomez[15], L. Kaya[10], Th. Kröll[16], T. Marchi[2], R. Menegazzo[4], D. Mengoni[4], D. R. Napoli[2], G. O'Neill[17], J. Pakarinen[14], Zs. Podolyák[18], F. Recchia[4], P. Reiter[10], D. Rosiak[10], J. Snall[12,19], P. Spagnoletti[20], D. Testov[4], S. Thiel[10], N. Warr[10], and R. Zidarova[14]
Published 19 November 2020

Phys. Rev. C **102**, 054610
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.054610
Measurement of fission-fragment mass distributions in the multinucleon transfer channels of the 18O+237Np reaction
M. J. Vermeulen[1], K. Nishio[1,*], K. Hirose[1], K. R. Kean[2,1], H. Makii[1], R. Orlandi[1], K. Tsukada[1], I. Tsekhanovich[3], A. N. Andreyev[4,1], S. Ishizaki[5], M. Okubayashi[5], S. Tanaka[5,1], and Y. Aritomo[5]
Published 20 November 2020

Phys. Rev. C **102**, 055203
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.055203
Elliptic and triangular flow of (anti)deuterons in Pb-Pb collisions at $\sqrt{s_{NN}}$=5.02 TeV
S. Acharya *et al.* (ALICE Collaboration)
Published 17 November 2020

Phys. Rev. C **102**, 055204
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.055204
Dielectron production in proton-proton and proton-lead collisions at $\sqrt{s_{NN}}$ =5.02TeV
S. Acharya *et al.* (ALICE Collaboration)
Published 25 November 2020

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2. News to Report

a. Science and Social Media

Registration is now open

This virtual lecture is organised by the IoP South Central Branch committee and is open to everyone interested, it is aimed primarily at researchers in academia and industry interested in exploring the risks and rewards of using social media to communicate research. The talk will be delivered by Dr Jess Wade and Dr Ben Britton from Imperial College London and follows a recent paper both published in this area:

https://www.nature.com/articles/s41570-019-0121-3.

Dr Wade and Dr Britton will showcase the rewards and risks of social media with some pragmatic advice and examples of opportunities, followed by a moderated discussion of issues and ideas from the audience. The talk is well suited for anyone who is engaged in research in academia and industry.

Date: 11th December 2020

Time: 7-8pm

Register here:
https://attendee.gotowebinar.com/register/8719251863696731406

For more details please contact chantal.nobs@ukaea.uk

Contribution by Chantal Nobs (UKAEA)

b. Nuclear Physics Group Early Career Prize: Call for Nominations

IOP Nuclear Physics Early Career Researcher Prize

We would like to announce the call for nominations for the IOP Nuclear Physics Group Early Career Researcher Prize. This prize is awarded to an individual who has made a significant contribution to either experimental or theoretical nuclear physics research in either fundamental or applied areas.

Researchers who are within 6 years of the completion of their Ph.D. or, for those without a Ph.D, within 10 years of the start of their first employment contract where research is the primary function of their role are eligible. The winner receives £250 and is invited to present at the annual IOP Nuclear Physics Conference.

Details of the award can be found on our webpage along with a nomination form for download. This should be sent, along with a supporting statement from a referee external to the nominee's current place of study or work, to the Secretary of the Nuclear Physics Group, James Benstead, at james.benstead@awe.co.uk no later than

5 February 2021.

We also support anyone wishing to self-nominate, though students should have the support of their supervisor in doing so.

Contribution by David Sharp
(University of Manchester)

c. APS Journal Changes

The American Physical Society has announced that from 1st January 2021 onwards, Rapid Communications articles published in several of their journals, including Phys. Rev. C, will now be rebranded as 'Letters'. This is to ensure consistent nomenclature and conventions across different journals.

More information can be found at:
https://journals.aps.org/edannounce/rapid-communications-will-be-letters

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3. Outreach Activity

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4. Media Interactions

a. The baryon density of the Universe from an improved rate of deuterium burning

The nuclear physics paper below has attracted media attention. Links to two articles are provided.

Nature **volume 587**, pages210–213(2020)
https://www.nature.com/articles/s41586-020-2878-4
The baryon density of the Universe from an improved rate of deuterium burning
V. Mossa, K. Stöckel, F. Cavanna, F. Ferraro, M. Aliotta, F. Barile, D. Bemmerer, A. Best, A. Boeltzig, C. Broggini, C. G. Bruno, A. Caciolli, T. Chillery, G. F. Ciani, P. Corvisiero, L. Csedreki, T. Davinson, R. Depalo, A. Di Leva, Z. Elekes, E. M. Fiore, A. Formicola, Zs. Fülöp, G. Gervino, A. Guglielmetti, C. Gustavino, G. Gyürky, G. Imbriani, M. Junker, A. Kievsky, I. Kochanek, M. Lugaro, L. E. Marcucci, G. Mangano, P. Marigo, E. Masha, R. Menegazzo, F. R. Pantaleo, V. Paticchio, R. Perrino, D. Piatti, O. Pisanti, P. Prati, L. Schiavulli, O. Straniero, T. Szücs, M. P. Takács, D. Trezzi, M. Viviani & S. Zavatarelli
Published: 11 November 2020

Articles:
https://www.nature.com/articles/d41586-020-03117-3

https://www.quantamagazine.org/physicists-pin-down-nuclear-reaction-from-moments-after-the-big-bang-20201111/