UK Nuclear Activity

August 2020 Issue 86

In this issue,

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

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1. Nuclear Physics Publications for August (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**, 024312 **(Editor's pick)**
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024312
Laser-assisted decay spectroscopy for the ground states of 180,182Au
R. D. Harding[1,2], A. N. Andreyev[1,3,*], A. E. Barzakh[4], D. Atanasov[5,†], J. G. Cubiss[1], P. Van Duppen[6], M. Al Monthery[1], N. A. Althubiti[7,‡], B. Andel[6,8], S. Antalic[8], K. Blaum[5], T. E. Cocolios[6,7], T. Day Goodacre[2,7,§], A. de Roubin[5,‖], G. J. Farooq-Smith[6,7], D. V. Fedorov[4], V. N. Fedosseev[2], D. A. Fink[2,5], L. P. Gaffney[2,9], L. Ghys[6,¶], D. T. Joss[9], F. Herfurth[10], M. Huyse[6], N. Imai[11], S. Kreim[2,5], D. Lunney[12,#], K. M. Lynch[2,7], V. Manea[5,#], B. A. Marsh[2], Y. Martinez Palenzuela[2,6], P. L. Molkanov[4], D. Neidherr[10], R. D. Page[9], A. Pastore[1], M. Rosenbusch[13], R. E. Rossel[2,14], S. Rothe[2,14], L. Schweikhard[13], M. D. Seliverstov[4], S. Sels[6], C. Van Beveren[6], E. Verstraelen[6], A. Welker[2,15], F. Wienholtz[2,16,13], R. N. Wolf[5,13,**], and K. Zuber[15]
Published 11 August 2020

IOP SciNotes **1**, 025201 (2020)
http://dx.doi.org/10.1088/2633-1357/ab952a
Internuclear potentials from the Sky3d code
P. D. Stevenson
Published 21 July 2020

Phys. Rev. C **102**, 024322
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024322
Decay studies of the long-lived states in 186Tl
M. Stryjczyk[1,*], B. Andel[1,2], A. N. Andreyev[3,4], J. Cubiss[5,3], J. Pakarinen[6,7], K. Rezynkina[1,8], P. Van Duppen[1], S. Antalic[2], T. Berry[9], M. J. G. Borge[10,5], C. Clisu[11], D. M. Cox[12], H. De Witte[1], L. M. Fraile[13], H. O. U. Fynbo[14], L. P. Gaffney[5], L. J. Harkness-Brennan[15], M. Huyse[1], A. Illana[16,6,7], D. S. Judson[15], J. Konki[5], J. Kurcewicz[5], I. Lazarus[17], R. Lica[11,5], M. Madurga[5], N. Marginean[11], R. Marginean[11], C. Mihai[11], P. Mosat[2], E. Nacher[18], A. Negret[11], J. Ojala[6,7], J. D. Ovejas[10], R. D. Page[15], P. Papadakis[15,17], S. Pascu[11], A. Perea[10], Zs. Podolyák[9], V. Pucknell[17], E. Rapisarda[5], F. Rotaru[11], C. Sotty[11], O. Tengblad[10], V. Vedia[13], S. Viñals[10], R. Wadsworth[3], N. Warr[19], and K. Wrzosek-Lipska[20]
Published 18 August 2020

Phys. Rev. C **102**, 024301
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024301
Isomeric and β-decay spectroscopy of 173,174Ho
J. J. Liu[1], J. Lee[1,*], H. Watanabe[2,3,†], S. Nishimura[3], G. X. Zhang[2,3], J. Wu[3,4], P. M. Walker[5], P. H. Regan[5,6], P.-A. Söderström[3], H. Kanaoka[7], Z. Korkulu[3,8], P. S. Lee[9], A. Yagi[7], A. C. Dai[4], F. R. Xu[4], D. S. Ahn[3], T. Alharbi[10], H. Baba[3], F. Browne[11], A. M. Bruce[11], R. J. Carroll[7], K. Y. Chae[12], Zs. Dombradi[8], P. Doornenbal[3], A. Estrade[13], N. Fukuda[3], C. Griffin[11], E. Ideguchi[14], N. Inabe[3], T. Isobe[3], S. Kanaya[7], I. Kojouharov[15], F. G. Kondev[16], T. Kubo[3], S. Kubono[3], N. Kurz[15], I. Kuti[8], S. Lalkovski[5], G. J. Lane[17], C. S. Lee[18], E. J. Lee[12], G. Lorusso[3,5,6], G. Lotay[5], C.-B. Moon[19], I. Nishizuka[20], C. R. Nita[10,21], A. Odahara[7], Z. Patel[5], V. H. Phong[3,22], Zs. Podolyák[5], O. J. Roberts[23], H. Sakurai[3], H. Schaffner[15], C. M. Shand[5], Y. Shimizu[3], T. Sumikama[20], H. Suzuki[3], H. Takeda[3], S. Terashima[2,3], Zs. Vajta[8], J. J. Valiente-Dobón[24], and Z. Y. Xu[1]
Published 3 August 2020

Phys. Rev. C **102**, 024318
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024318
New, low-energy excitations in 107Mo and 109Mo
W. Urban[1], T. Rząca-Urban[1], J. Wiśniewski[1], J. Kurpeta[1], A. Płochocki[1], J. P. Greene[2], A. G. Smith[3], and G. S. Simpson[3]
Published 14 August 2020

Phys. Rev. C **102**, 024320
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024320
Improved precision on the experimental E0 decay branching ratio of the Hoyle state
T. K. Eriksen[1,*], T. Kibédi[1,†], M. W. Reed[1], A. E. Stuchbery[1], K. J. Cook[1,2], A. Akber[1], B. Alshahrani[1,‡], A. A. Avaa[3,4], K. Banerjee[1,5], A. C. Berriman[1], L. T. Bezzina[1], L. Bignell[1], J. Buete[1], I. P. Carter[1], B. J. Coombes[1], J. T. H. Dowie[1], M. Dasgupta[1], L. J. Evitts[6,7,§], A. B. Garnsworthy[6], M. S. M. Gerathy[1], T. J. Gray[1], D. J. Hinde[1], T. H. Hoang[8], S. S. Hota[1], E. Ideguchi[8], P. Jones[3], G. J. Lane[1], B. P. McCormick[1], A. J. Mitchell[1], N. Palalani[1,¶], T. Palazzo[1], M. Ripper[1], E. C. Simpson[1], J. Smallcombe[6,**], B. M. A. Swinton-Bland[1], T. Tanaka[1], T. G. Tornyi[1,††], and M. O. de Vries[1]
Published 17 August 2020

Phys. Rev. C **102**, 024321
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024321
Structure of 33Si and the magicity of the N=20 gap at Z=14
S. Jongile[1,2], A. Lemasson[3,4], O. Sorlin[3], M. Wiedeking[2,5], P. Papka[1,2], D. Bazin[4], C. Borcea[6], R. Borcea[6], A. Gade[4], H. Iwasaki[4], E. Khan[8], A. Lepailleur[3], A. Mutschler[7,3], F. Nowacki[9], F. Recchia[4], T. Roger[3], F. Rotaru[6], M. Stanoiu[6], S. R. Stroberg[4,10], J. A. Tostevin[11], M. Vandebrouck[7,3], D. Weisshaar[4], and K. Wimmer[12,13,4]
Published 18 August 2020

Phys. Rev. C **102**, 024323
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024323
Collective 2p-2h intruder states in 118Sn studied via β decay of 118In using the GRIFFIN spectrometer at TRIUMF
K. Ortner[1,*], C. Andreoiu[1], M. Spieker[2,†], G. C. Ball[3], N. Bernier[3,4], H. Bidaman[5], V. Bildstein[5], M. Bowry[3,‡], D. S. Cross[1], M. R. Dunlop[5], R. Dunlop[5], F. H. Garcia[1], A. B. Garnsworthy[3], P. E. Garrett[5], J. Henderson[3,§], J. Measures[3,6], B. Olaizola[3], J. Park[3,4,‖], C. M. Petrache[7], J. L. Pore[1,¶], K. Raymond[1], J. K. Smith[3,#], D. Southall[3,**], C. E. Svensson[5], M. Ticu[1], J. Turko[5], K. Whitmore[1], and T. Zidar[5]
Published 18 August 2020

Phys. Rev. C **102**, 024335
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024335
Single-particle structure in neutron-rich Sr isotopes approaching the N=60 shape transition
S. Cruz[1,2], K. Wimmer[3,4,5,*], S. S. Bhattacharjee[2], P. C. Bender[2], G. Hackman[2], R. Krücken[1,2], F. Ames[2,6], C. Andreoiu[7], R. A. E. Austin[6], C. S. Bancroft[4], R. Braid[8], T. Bruhn[2], W. N. Catford[9], A. Cheeseman[2], A. Chester[10], D. S. Cross[7], C. Aa. Diget[11], T. Drake[12], A. B. Garnsworthy[2], R. Kanungo[2,6], A. Knapton[9], W. Korten[13,2], K. Kuhn[8], J. Lassen[2,10], R. Laxdal[2], M. Marchetto[2], A. Matta[9,14], D. Miller[2], M. Moukaddam[2], N. A. Orr[14], N. Sachmpazidi[4], A. Sanetullaev[6,2,†], C. E. Svensson[15], N. Terpstra[4], C. Unsworth[2], and P. J. Voss[7]
Published 31 August 2020

Phys. Rev. C **102**, 024337
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024337
Decay spectroscopy of 129Cd
Y. Saito[1,2,*], I. Dillmann[2,3], R. Krücken[1,2], N. Bernier[1,2], G. C. Ball[2], M. Bowry[2,†], C. Andreoiu[4], H. Bidaman[5], V. Bildstein[5], P. Boubel[5], C. Burbadge[5], R. Caballero-Folch[2], M. R. Dunlop[5], R. Dunlop[5], L. J. Evitts[2,6,‡], F. H. Garcia[4], A. B. Garnsworthy[2], P. E. Garrett[5], H. Grawe[7], G. Hackman[2], S. Hallam[2,6], J. Henderson[2,§], S. Ilyushkin[8], A. Jungclaus[9], D. Kisliuk[5], J. Lassen[2,10], R. Li[2], E. MacConnachie[2], A. D. MacLean[5], E. McGee[5], M. Moukaddam[2,‖], B. Olaizola[5,¶], E. Padilla-Rodal[11], J. Park[1,2,#], O. Paetkau[2], C. M. Petrache[12], J. L. Pore[4,**], A. J. Radich[5], P. Ruotsalainen[2,††], J. Smallcombe[2,‡‡], J. K. Smith[2,§§], C. E. Svensson[5], A. Teigelhöfer[2,10], J. Turko[5], and T. Zidar[5] (GRIFFIN collaboration)
Published 31 August 2020

Phys. Rev. C **102**, 024912
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.024912
K∗(892)0 and φ(1020) production at midrapidity in pp collisions at √S=8 TeV
S. Acharya *et al.* (ALICE Collaboration)
Published 17 August 2020

Phys. Rev. C **102**, 025801
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.025801
Shell-model studies of the astrophysical rp-process reactions 34S(p,γ)35Cl and 34g,mCl(p,γ)35Ar
W. A. Richter[1,2,*], B. A. Brown[3,9,†], R. Longland[4], C. Wrede[3,9], P. Denissenkov[5,‡], C. Fry[3], F. Herwig[5,9,‡], D. Kurtulgil[6,‡], M. Pignatari[7,8,9,‡], and R. Reifarth[6,‡]
Published 4 August 2020

Phys. Rev. Lett. **125**, 062501
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.125.062501
New 13C(α,n)16O Cross Section with Implications for Neutrino Mixing and Geoneutrino Measurements
M. Febbraro[1], R. J. deBoer[2], S. D. Pain[1], R. Toomey[3,4], F. D. Becchetti[5], A. Boeltzig[2,*], Y. Chen[2], K. A. Chipps[1], M. Couder[2], K. L. Jones[6], E. Lamere[2,†], Q. Liu[2], S. Lyons[2,‡], K. T. Macon[2], L. Morales[2], W. A. Peters[1,6], D. Robertson[2], B. C. Rasco[6,1], K. Smith[6,‖], C. Seymour[2], G. Seymour[2,§], M. S. Smith[1], E. Stech[2], B. Vande Kolk[2], and M. Wiescher[2]
Published 7 August 2020
Phys. Rev. Lett. **125**, 092501

https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.125.092501

ΔK=0 M1 Excitation Strength of the Well-Deformed Nucleus 164Dy from K Mixing

T. Beck[1,†], V. Werner[1,2], N. Pietralla[1], M. Bhike[3], N. Cooper[2,*], U. Friman-Gayer[1,‡], J. Isaak[1], R. V. Jolos[4,5], J. Kleemann[1], Krishichayan[3], O. Papst[1], W. Tornow[3], C. Bernards[2], B. P. Crider[6,§], R. S. Ilieva[2,7], B. Löher[8], C. Mihai[9], F. Naqvi[2,‖], S. Pascu[9], E. E. Peters[10], F. M. Prados-Estevez[6,10], T. J. Ross[10], D. Savran[8], J. R. Vanhoy[11], and A. Zilges[12]

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2. News to Report

a. Prof Regan made NPL Fellow

Professor Patrick 'Paddy' Regan, FInstP, is the first NPL Fellow in Nuclear and Radiation Science and Metrology. He leads NPL's science in nuclear structure physics, radioactive decay characterisation and radioactivity measurement. Paddy joined NPL in 2013 as the UK's first Professor of Nuclear Metrology, joint with the University of Surrey.

NPL Fellowship is a recognition of individual merit awarded to scientists who are making very significant contributions to NPL's scientific achievement and standing. Professor Regan is being acknowledged for his scientific leadership in the field of nuclear and radiation physics and its applications to both fundamental and applied measurement problems.

Since taking up the UK's first Professorship in Nuclear Metrology joint between NPL and the University of Surrey in 2013, Professor Regan's team has led research into complex data analysis and calibration techniques for nuclear structure science and the related provision of standards and reference materials for applications in the energy, environment and health sectors. Impact from these research contributions crosses over areas including 'big science questions' such as understanding the nature of nuclear matter and nucleosynthesis of the elements formed in stellar interiors to direct applications including nuclear forensics; power generation and waste management; and nuclear medicine.

Professor Regan aims to provide the academic 'bridge' between the worlds of academic, fundamental research into nuclear structure physics and the application of this knowledge into the National Metrology Institute and nuclear science industrial sectors.

Professor Regan has made significant contributions to NPL's external profile. He sits on various national and international nuclear science committees, including several UKRI and overseas research grant and international laboratory evaluation reviews.

He has also made major contributions to the scientific community with more than 300 co-authored, peer-reviewed publications and acted as primary supervisor for more than 40 successful doctoral research students in nuclear and radiation science.

Further information can be found via the NPL and Surrey links below.

https://www.npl.co.uk/news-and-press-office/new-npl-fellow-professor-regan

https://www.surrey.ac.uk/news/surrey-professor-awarded-first-npl-fellowship-nuclear-and-radiation-science-and-metrology

Contributed by P. Regan (Univ. Surrey) (pictured above)

b. New UK representative to ISOLDE

Dr Liam Gaffney has been elected as the new UK representative to the ISOLDE Collaboration Committee.

Following an election last month, it is our pleasure to inform the community that Dr Liam Gaffney (Ernest Rutherford Fellow based at the University of Liverpool) has been elected to serve as the new UK representative to the ISOLDE Collaboration Committee (ISCC) for a period of 3 years.

Liam takes over from Dan Doherty (University of Surrey) from November 2020. We would like to take this opportunity to wish Liam every success representing the UK community and to thank Andrei Andreyev (York) and David Sharp (Manchester) for standing in the election as well as the community for casting their votes.

Contribution by Daniel Doherty (Surrey) and David Joss (Liverpool)

c. Sellafield Game Changers

As part of their decommissioning activities, Sellafield need to map and characterise legacy waste disposal facilities including landfill, land-raise, tips and trenches. In particular they need to be able to undertake measurements to confirm that these waste areas don't contain any radioactive material.

Through Sellafield's Game Changers programme, £10,000 grants are offered to organisations who are interested in working with Sellafield. This funding is to enable an exploration of ideas which might help Sellafield solve their challenges and to produce business cases for larger pieces of work. Larger scale projects can then be funded with the intention that they then go on to become commercially deployed solutions on site.

There's more information about the challenge on the Game Changers website:

https://www.gamechangers.technology/challenges/characterisation-of-landfill-and-disposal-areas/

There's also a webinar on the 16th September to explain the challenge in more detail and to give interested organisations a chance to ask questions.

If you'd like any further information contact Josephine Tunney via *jo.tunney@fis360.com*

Contribution by Josephine Tunney (fis360)

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3. Outreach Activity

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4. Media Interactions

a. Polonium and the Piano Player

It's a classic spy story, where truth is stranger than fiction. Sky News have now produced a "StoryCast" (link below) in four parts, about the 2006 poisoning of Alexander Litvinenko, with a focus on the involvement of the piano player, Derek Conlon, in the Millennium Hotel, where the polonium poisoning took place. Phil Walker contributes comments about the use of polonium.

https://podcasts.apple.com/gb/podcast/polonium-the-piano-player/id1522548553

Contributed by Phil Walker (Univ. Surrey)