UK Nuclear Activity

September 2020 Issue 87

In this issue,

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

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1. Nuclear Physics Publications for September (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, 034616 **(Editor's pick)**
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034616
Measurement of muon-induced high-energy neutrons from rock in an underground Gd-doped water detector
F. Sutanto[1,2,*], O. A. Akindele[2], M. Askins[3,†], M. Bergevin[2,‡], A. Bernstein[2], N. S. Bowden[2], S. Dazeley[2,§], P. Jaffke[4], I. Jovanovic[1], S. Quillin[5], C. Roecker[6,‖], and S. D. Rountree[4]
Published 28 September 2020

Front. Phys., 11 September 2020
https://www.frontiersin.org/articles/10.3389/fphy.2020.00351/full
Shape Evolutions in Fission Dynamics Within Time-Dependent Hartree-Fock Approach
Marko Pancic, Yu Qiang, Junchen Pei and Paul Stevenson
Published 11 September 2020

Phys. Rev. C 102, 031303(R)
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.031303
Examination of the inversion of isobaric analogue states in mirror nuclei
J. Henderson and S. R. Stroberg
Published 28 September 2020

Phys. Rev. C 102, 032201(R)
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.032201
First measurement of direct photoproduction of the a2(1320)0 meson on the proton
Celentano[1], M. Battaglieri[2,1], R. De Vita[1], L. Marsicano[1], V. Mathieu[3], A. Pilloni[4,1], A. Szczepaniak[5,6,7], K. P. Adhikari[8], S. Adhikari[9], M. J. Amaryan[8], G. Angelini[10], H. Atac[11], L. Barion[12], I. Bedlinskiy[13], Fatiha Benmokhtar[14], A. Bianconi[15,16], A. S. Biselli[17], F. Bossù[18], S. Boiarinov[2], W. J. Briscoe[10], W. K. Brooks[19,2], D. Bulumulla[8], V. D. Burkert[2], D. S. Carman[2], J. C. Carvajal[9], P. Chatagnon[20], T. Chetry[21], G. Ciullo[12,22], L. Clark[23], P. L. Cole[24,25], M. Contalbrigo[12], O. Cortes[10], V. Crede[26], R. Cruz-Torres[27], A. D'Angelo[28,29], N. Dashyan[30], M. Defurne[18], A. Deur[2], S. Diehl[31], C. Djalali[32,33], M. Dugger[34], R. Dupre[20], H. Egiyan[2,35], M. Ehrhart[36], A. El Alaoui[19], L. El Fassi[21,36], L. Elouadrhiri[2], P. Eugenio[26], G. Fedotov[37,*], R. Fersch[38,39], A. Filippi[40], G. Gavalian[2,35], N. Gevorgyan[30], F. X. Girod[2,18], D. I. Glazier[23], W. Gohn[31], E. Golovatch[37], R. W. Gothe[33], K. A. Griffioen[39], M. Guidal[20], K. Hafidi[36], H. Hakobyan[19,30], N. Harrison[2], M. Hattawy[8], F. Hauenstein[8], T. B. Hayward[39], D. Heddle[38,2], K. Hicks[32], A. Hobart[20], M. Holtrop[35], Y. Ilieva[33,10], D. G. Ireland[23], B. S. Ishkhanov[37], E. L. Isupov[37], D. Jenkins[41], H. S. Jo[42], K. Joo[31], S. Joosten[36], D. Keller[43,32], M. Khachatryan[8], A. Khanal[9], M. Khandaker[44,†], A. Kim[31], C. W. Kim[10], W. Kim[42], F. J. Klein[45], V. Kubarovsky[2], L. Lanza[28], M. Leali[15,16], P. Lenisa[12,22], K. Livingston[23], V. Lucherini[46], I. J. D. MacGregor[23], D. Marchand[20], N. Markov[2,31], V. Mascagna[47,16,‡], M. E. McCracken[48], B. McKinnon[23], Z.-E. Meziani[36], M. Mirazita[46], V. Mokeev[2], A. Movsisyan[12], E. Munevar[10,§], C. Munoz Camacho[20], P. Nadel-Turonski[2], K. Neupane[33], S. Niccolai[20], G. Niculescu[49], M. Osipenko[1], A. I. Ostrovidov[26], M. Paolone[11], L. L. Pappalardo[12,22], R. Paremuzyan[35], E. Pasyuk[2], W. Phelps[10], O. Pogorelko[13], J. W. Price[50], Y. Prok[8,43], M. Ripani[1], J. Ritman[51], A. Rizzo[28,29], G. Rosner[23], J. Rowley[32], F. Sabatié[18], C. Salgado[44], A. Schmidt[10], R. A. Schumacher[48], U. Shrestha[32], D. Sokan[23], O. Soto[46], N. Sparveris[11], S. Stepanyan[2], I. I. Strakovsky[10], S. Strauch[33], J. A. Tan[42], N. Tyler[33], M. Ungaro[2,31], L. Venturelli[15,16], H. Voskanyan[30], E. Voutier[20], D. Watts[52], X. Wei[2], M. H. Wood[53,33], N. Zachariou[52], J. Zhang[43], and Z. W. Zhao[54] (The CLAS Collaboration)
Published 28 September 2020

Phys. Rev. C 102, 034304
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034304
Tensor and pairing interactions within the quark-meson coupling energy-density functional
K. L. Martinez, A. W. Thomas, P. A. M. Guichon, and J. R. Stone
Published 3 September 2020

Phys. Rev. C 102, 034305
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034305
Exploring the boundaries of the nuclear landscape: α-decay properties of 211Pa
K. Auranen[1,*], J. Uusitalo[1], H. Badran[1,†], T. Grahn[1], P. T. Greenlees[1], A. Herzáň[1,2], U. Jakobsson[1], R. Julin[1], S. Juutinen[1], J. Konki[1], M. Leino[1], A.-P. Leppänen[3], G. O'Neill[1,4,‡], J. Pakarinen[1], P. Papadakis[1,§], J. Partanen[1,‖], P. Peura[1], P. Rahkila[1], P. Ruotsalainen[1], M. Sandzelius[1], J. Sarén[1], C. Scholey[1,¶], L. Sinclair[1,5], J. Sorri[1,†], S. Stolze[1,#], and A. Voss[1]
Published 3 September 2020

Phys. Rev. C 102, 034314
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034314
β decay of Ni75 and the systematics of the low-lying level structure of neutron-rich odd-A Cu isotopes
F. L. Bello Garrote[1], E. Sahin[1,*], Y. Tsunoda[2], T. Otsuka[2,3,4,5], A. Görgen[1], M. Niikura[3], S. Nishimura[6], G. de Angelis[7], G. Benzoni[8], A. I. Morales[9,8,10], V. Modamio[1], Z. Y. Xu[3], H. Baba[6], F. Browne[6,11], A. M. Bruce[11], S. Ceruti[8], F. C. L. Crespi[8,9], R. Daido[12], M.-C. Delattre[13], P. Doornenbal[6], Zs. Dombradi[14], Y. Fang[12], S. Franchoo[13], G. Gey[6,15], A. Gottardo[7], K. Hadyńska-Klęk[16], T. Isobe[6], P. R. John[17], H. S. Jung[18], I. Kojouharov[19], T. Kubo[6], N. Kurz[19], I. Kuti[14], Z. Li[20], G. Lorusso[6], I. Matea[13], K. Matsui[3], D. Mengoni[17], T. Miyazaki[3], S. Momiyama[3], P. Morfouace[13], D. R. Napoli[7], F. Naqvi[21], H. Nishibata[12], A. Odahara[12], R. Orlandi[22,23], Z. Patel[6,16], S. Rice[6,16], H. Sakurai[3,6], H. Schaffner[19], L. Sinclair[6,24], P.-A. Söderström[6], D. Sohler[14], I. G. Stefan[13], T. Sumikama[25], D. Suzuki[13], R. Taniuchi[3], J. Taprogge[6,26,27], Zs. Vajta[6,14], J. J. Valiente-Dobón[7], H. Watanabe[28], V. Werner[21,29], J. Wu[6,20], A. Yagi[12], M. Yalcinkaya[30], R. Yokoyama[3], and K. Yoshinaga[31]

Published 10 September 2020
Phys. Rev. C 102, 034319
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034319
Isomeric and collective structures in neutron-rich hafnium isotopes
F. Amirzadeh, A. Kardan, P. M. Walker, and Hai-Liang Ma
Published 16 September 2020

Phys. Rev. C 102, 034323
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034323
Photo response of 164Dy
O. Papst[1,*], V. Werner[1,2], J. Isaak[1], N. Pietralla[1], T. Beck[1], C. Bernards[2], M. Bhike[3], N. Cooper[2,†], B. P. Crider[4,‡], U. Friman-Gayer[1,§], J. Kleemann[1], Krishichayan[3], B. Löher[5], F. Naqvi[2,‖], E. E. Peters[6], F. M. Prados-Estévez[4,6], R. S. Ilieva[2,7], T. J. Ross[6], D. Savran[5], W. Tornow[3], and J. R. Vanhoy[8]
Published 21 September 2020

Phys. Rev. C 102, 034324
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034324
Evolution of proton single-particle states in neutron-rich Sb isotopes beyond N=82
A. Jungclaus[1,*], J. M. Keatings[2], G. S. Simpson[3], H. Naïdja[4], A. Gargano[5], S. Nishimura[6], P. Doornenbal[6], G. Gey[3,7,6], G. Lorusso[6], P.-A. Söderström[6], T. Sumikama[8], J. Taprogge[1,9,6], Z. Y. Xu[6], H. Baba[6], F. Browne[10,6], N. Fukuda[6], N. Inabe[6], T. Isobe[6], H. S. Jung[11], D. Kameda[6], G. D. Kim[12], Y.-K. Kim[12,13], I. Kojouharov[14], T. Kubo[6], N. Kurz[14], Y. K. Kwon[12], Z. Li[15], H. Sakurai[6,16], H. Schaffner[14], Y. Shimizu[6], H. Suzuki[6], H. Takeda[6], Z. Vajta[17], H. Watanabe[6], J. Wu[15,6], A. Yagi[18], K. Yoshinaga[19], S. Bönig[20], J.-M. Daugas[21], R. Gernhäuser[22], S. Ilieva[20], T. Kröll[20], A. Montaner-Piza[23], K. Moschner[24], D. Mücher[22], H. Nishibata[18], A. Odahara[18], R. Orlandi[25], M. Scheck[26], K. Steiger[22], and A. Wendt[24]
Published 23 September 2020

Phys. Rev. C 102, 034325
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034325
Shell structure of 43S and collapse of the N=28 shell closure
S. Momiyama[1], K. Wimmer[1,2], D. Bazin[3], J. Belarge[3], P. Bender[3], B. Elman[3,4], A. Gade[3,4], K. W. Kemper[5], N. Kitamura[6], B. Longfellow[3,4], E. Lunderberg[3,4], M. Niikura[1], S. Ota[6], P. Schrock[6], J. A. Tostevin[7], and D. Weisshaar[3]
Published 25 September 2020

Phys. Rev. C 102, 034609
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.034609
Multi-neutron transfer in 8He-induced reactions near the Coulomb barrier
I. Martel, N. Keeley, K. W. Kemper, and K. Rusek
Published 10 September 2020

Phys. Rev. C 102, 035205
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.035205
Extracting the spin polarizabilities of the proton by measurement of Compton double-polarization observables
D. Paudyal[1], P. P. Martel[2,3,*], G. M. Huber[1], D. Hornidge[2], S. Abt[4], P. Achenbach[3], P. Adlarson[3], F. Afzal[5], Z. Ahmed[1], C. S. Akondi[6], J. R. M. Annand[7], H. J. Arends[3], M. Bashkanov[8], R. Beck[5], M. Biroth[3], N. S. Borisov[9], A. Braghieri[10], W. J. Briscoe[11], F. Cividini[3], S. Costanza[10], C. Collicott[12,13], A. Denig[3], M. Dieterle[4], E. J. Downie[11], P. Drexler[3], M. I. Ferretti-Bondy[3], S. Gardner[7], S. Garni[4], D. I. Glazier[7], D. Glowa[14], I. Gorodnov[9], W. Gradl[3], S. Günther[4], G. M. Gurevich[15], D. Hamilton[7], L. Heijkenskjöld[3], A. Käser[4], V. L. Kashevarov[3,9], S. Kay[1], I. Keshelashvili[4], R. Kondratiev[15], M. Korolija[16], B. Krusche[4], A. B.

Lazarev[9], J. M. Linturi[3], V. Lisin[15], K. Livingston[7], S. Lutterer[4], I. J. D. MacGregor[7], R. Macrae[7], J. Mancell[7], D. M. Manley[6], V. Metag[17], W. Meyer[18], R. Miskimen[19], E. Mornacchi[3], C. Mullen[7], A. Mushkarenkov[19,15], A. B. Neganov[9], A. Neiser[3], M. Oberle[4], M. Ostrick[3], P. B. Otte[3], P. Pedroni[10], A. Polonski[15], A. Powell[7], S. N. Prakhov[3,20], A. Rajabi[19], G. Reicherz[18], G. Ron[21], T. Rostomyan[4], A. Sarty[13], C. Sfienti[3], M. H. Sikora[14], V. Sokhoyan[3,11], K. Spieker[5], O. Steffen[3], I. I. Strakovsky[11], Th. Strub[4], I. Supek[16], A. Thiel[5], M. Thiel[3], A. Thomas[3], M. Unverzagt[3], Yu. A. Usov[9], S. Wagner[3], N. K. Walford[4], D. P. Watts[8], D. Werthmüller[8], J. Wettig[3], L. Witthauer[4], M. Wolfes[3], and L. Zana[22] (A2 Collaboration)
Published 25 September 2020

Phys. Rev. C 102, 035801
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.035801
First inverse kinematics study of the 22Ne(p,γ)23Na reaction and its role in AGB star and classical nova nucleosynthesis
M. Williams[1,2,*], A. Lennarz[2], A. M. Laird[1,†], U. Battino[3,†], J. José[4], D. Connolly[2,‡], C. Ruiz[2], A. Chen[5], B. Davids[2,6], N. Esker[2,§], B. R. Fulton[1], R. Garg[1,‖], M. Gay[7], U. Greife[8], U. Hager[9], D. Hutcheon[2], M. Lovely[8], S. Lyons[9,10], A. Psaltis[5], J. E. Riley[1], and A. Tattersall[3,†]
Published 8 September 2020

Phys. Rev. C 102, 035803
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.035803
Evaluation of the 13N(α,p)16O thermonuclear reaction rate and its impact on the isotopic composition of supernova grains
A. Meyer[1], N. de Séréville[1,*], A. M. Laird[2,3], F. Hammache[1], R. Longland[4,5], T. Lawson[6,7,3], M. Pignatari[6,7,3,8], L. Audouin[1], D. Beaumel[1], S. Fortier[1], J. Kiener[9], A. Lefebvre-Schuhl[9], M. G. Pellegriti[1,10], M. Stanoiu[11,12], and V. Tatischeff[9]
Published 9 September 2020

Phys. Rev. C 102, 035804
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.102.035804
Spectroscopy of 30P and the abundance of 29Si in presolar grains
G. Lotay[1], D. T. Doherty[1], D. Seweryniak[2], M. P. Carpenter[2], R. V. F. Janssens[3,4], J. José[5,6], A. M. Rogers[7], P. J. Woods[8], and S. Zhu[2,*]
Published 22 September 2020

Phys. Rev. Lett. 125, 102503
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.125.102503
Accessing the Single-Particle Structure of the Pygmy Dipole Resonance in 208Pb
M. Spieker[1,*], A. Heusler[2], B. A. Brown[3,4], T. Faestermann[5], R. Hertenberger[6], G. Potel[7], M. Scheck[8,9], N. Tsoneva[10], M. Weinert[11], H.-F. Wirth[6], and A. Zilges[11]
Published 2 September 2020

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2. News to Report

a. Dr Paul Stevenson appointed as a William Penney Fellow

Dr Paul Stevenson, Head of the Nuclear Theory Group at the University of Surrey, has been appointed an AWE William Penney Fellow (WPF). WPFs are academic researchers at the very tops of their respective fields, that AWE sponsor in exchange for research into topics of relevance to their Programme.

Dr Stevenson's appointment will provide AWE with additional insight into a range of nuclear theory topics, including compound-nucleus population and decay, and time-dependent Hartree-Fock methods.

b. PhD position at the University of Surrey

Applications are invited for a fully-funded (for a UK student) PhD studentship working in the theoretical nuclear physics group at the University of Surrey on the application of quantum computing to the solution of problems in many-body physics as applied to atomic nuclei. You will join a group working on various approaches to the understanding of the properties of nuclear structure and reactions, developing a new approach to using the emerging field of quantum computing as a means of directly simulating the behaviour of nucleons in a nucleus. The project is sponsored by AWE plc and you will be jointly supervised by University of Surrey and AWE staff.

More details can be found at either:
https://www.findaphd.com/phds/project/phd-studentship-opportunity-in-quantum-computing-for-nuclear-physics/?p123717
or
https://www.surrey.ac.uk/fees-and-funding/studentships

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3. Outreach Activity

a. Space week

Virtual World Space Week 2020 – 4th-10th October 2020

Launching from the success of our 2019 high street event and embracing the ways we have adapted to the virtual world the IoP South Central branch are offering a wide variety of virtual activities for World Space Week 2020, and everyone is welcome! Details of each activity are provided below, all of our online events will have closed captioning and audio description available where applicable and with such a variety of activities we believe there will be something for everyone to enjoy. To get all the updates in the lead up to WSW2020 join our Facebook event https://fb.me/e/7iUNnlqQx, in addition to the events below between 12-1pm each weekday we will be sharing ideas for craft activities to try at home during *"space"*craft hour. We would love to see your pictures showing how you are getting involved with World Space Week 2020, wherever you are, tag us on Twitter using @IOPSouthCentral and Facebook @IOPSCB and use the hashtag #WSW2020.

Space-theme virtual quiz - *Friday 9th October at 5-6pm*
https://attendee.gotowebinar.com/register/6373727478774345485

Guide to Fake News (online activity and live Q&A) - *Tuesday 6th October 12-1pm*
https://attendee.gotowebinar.com/register/1742948440930594317

Walk/Run/Cycle the Solar System - *Start date 5th October, end date 11th October*
https://www.strava.com/clubs/743372

Egg drop challenge - *Deadline for entries: 10pm on 10th October 2020*
https://drive.google.com/file/d/1HlD5vISP6sn27CKOwg9pT4lcCzkIy5Ph/view?usp=sharing

NPL Where on Earth am I? GPS challenge (online activity and live results talk)
Start date: 29th October at
www.npl.co.uk/measurement-at-home/where-am-I
End date: 8th October (for results to be included in live event)
Live event: 10th October 2-3pm (link TBC)

Guildford Astronomical Society – *Sunday 4th October*
Daytime solar observing 12-1pm:
https://zoom.us/j/95638873982
Evening talk "Sputnik in Context" 5-6pm:
https://zoom.us/j/97020195434

Live storytelling: Ted's great space adventure (ages 3-5) - *Tuesday 6th October 10:30-11:30 - Elizabeth Avery*
https://attendee.gotowebinar.com/register/1380005611517108749

Storytime and play session (ages 3-5)
Molly and the Moon Wednesday 7th October 10:30-11:30 -
https://www.facebook.com/surreylibrariesUK

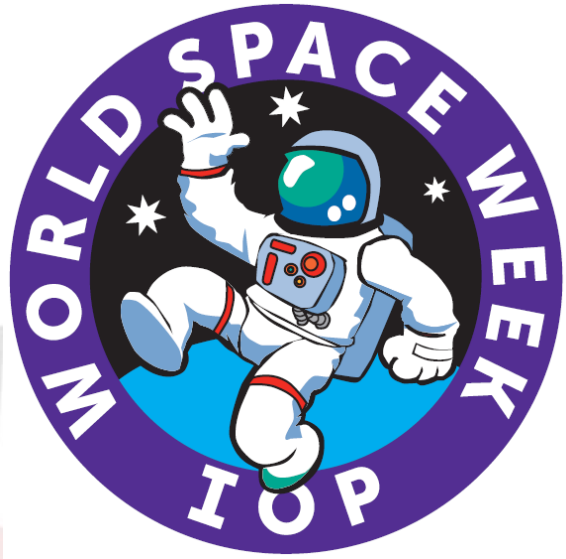
Falling Down Question Wednesday 14th October 10:30-11:30 -
https://www.facebook.com/surreylibrariesUK

The Day the Sun Didn't Come to Breakfast Wednesday 21st October 10:30-11:30 -
https://www.facebook.com/surreylibrariesUK

Lecture: "Radiation Protection – how to survive a journey to Mars" - *Sunday 4th October 3-4pm - Dr Elizabeth Cunningham*
https://attendee.gotowebinar.com/register/8324832852495332877

Lecture: To c or not to c - Physics in Science Fiction Writing - *Thursday 8th October 5-6pm - David Wilkinson*
https://attendee.gotowebinar.com/register/3849211262202669

Contributed by Chantal Nobs (UKAEA)



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4. Media Interactions

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