UK Nuclear Activity

August 2021 Issue 98

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.

Sensors 2021, **21**, 5238
https://www.mdpi.com/1424-8220/21/15/5238/htm
Convolutional Neural Networks for Challenges in Automated Nuclide Identification
Anthony N. Turner[1], Carl Wheldon[1], Tzany Kokalova Wheldon[1], Mark R. Gilbert[2], Lee W. Packer[2], Jonathan Burns[3] and Martin Freer[1]
Published: 3 August 2021

J. Phys. G: Nucl. Part. Phys. **48** 095102
https://iopscience.iop.org/article/10.1088/1361-6471/ac105d
Perturbative correction to the adiabatic approximation for (d, p) reactions
L Moschini[2,1], N K Timofeyuk[1] and R C Johnson[1]
Published 5 August 2021

The European Physical Journal A **56**, Article number: 300 (2020)
https://link.springer.com/article/10.1140/epja/s10050-020-00310-w
Study of cluster structures in nuclei through the ratio method
Pierre Capel, Ronald C. Johnson & Filomena M. Nunes
Published: 15 December 2020

Edited by James Benstead, IOP Nuclear Physics Group Committee
james.benstead@awe.co.uk or j.benstead@surrey.ac.uk

Nature Communications volume **12**, Article number: 4596 (2021)
https://www.nature.com/articles/s41467-021-24888-x
Evidence of a sudden increase in the nuclear size of proton-rich silver-96
M. Reponen, R. P. de Groote, L. Al Ayoubi, O. Beliuskina, M. L. Bissell, P. Campbell, L. Cañete, B. Cheal, K. Chrysalidis, C. Delafosse, A. de Roubin, C. S. Devlin, T. Eronen, R. F. Garcia Ruiz, S. Geldhof, W. Gins, M. Hukkanen, P. Imgram, A. Kankainen, M. Kortelainen, Á. Koszorús, S. Kujanpää, R. Mathieson, D. A. Nesterenko, I. Pohjalainen, M. Vilén, A. Zadvornaya & I. D. Moore
Published: 28 July 2021

Physics Letters B, Volume **819**, 136439
https://www.sciencedirect.com/science/article/pii/S0370269321003798?via%3Dihub
Proton-neutron pairing correlations in the self-conjugate nucleus ^{42}Sc
Á.Koszorús[a], L.J.Vormawah[a], R.Beerwerth[b], M.L.Bissell[c], P.Campbell[c], B.Cheal[a], C.S.Devlin[a], T.Eronen[d], S.Fritzsche[b], S.Geldhof[de], H.Heylen[ef], J.D.Holt[gh], A.Jokinen[d], S.Kelly[c], I.D.Moore, [d]T.Miyagi[g], S.Rinta-Antila[d], A.Voss[d], C.Wraith[a]
Available online 10 June 2021

Journal of Environmental Radioactivity 238-239 (2021) 106733
https://www.sciencedirect.com/science/article/pii/S0265931X21002058?via%3Dihub
Production and measurement of fission product noble gases
Matthew A. Goodwin, Steven J. Bell, Richard Britton, Ashley V. Davies, Marc Abilam, Sean M. Collins, Robert Shearman, Patrick H. Regan
Available online 4 September 2021

Il Nuovo Cimento **44** C (2021) 67
https://www.sif.it/riviste/sif/ncc/econtents/2021/044/02-03/article/39
DESPEC Phase-0 campaign at GSI
M. Polettini, S. Jazrawi, M. M. R. Chishti, A. Yaneva, B. Das, A. Banerjee, N. Hubbard, A. K. Mistry, H. M. Albers, R. Shearman, M. Górska, J. Gerl, P. H. Regan, B. Cederwall, J. Jolie, S. Alhomaidhi, T. Arici, G. Benzoni, P. Boutachkov, T. Davinson, T. Dickel, E. aettner, O. Hall, H. Heggen, P. R. John, I. Kojouharov, N. Kurz, B. S. Nara Singh, S. ietri, Zs. Podolyak, M. Rudigier, E. Sahin, H. Schaffner, C. Scheidenberger, A. Sharma, J. Vesic, H. Weick, H. J. Wollersheim, U. Ahmed, Ö. Aktas, A. Algora, C. Appleton, J. enito, A. Blazhev, A. Bracco, A. Bruce, M. Brunet, R. Canavan, A. Esmaylzadeh, L. M. raile, H. Grawe, G. Häfner, D. Kahl, V. Karayonchev, R. Kern, G. Kosir, R. Lozeva, P. apiralla, R. Page, C. M. Petrache, J. Petrovic, N. Pietralla, J.-M. Régis, P. uotsalainen, L. Sexton, V. Sanchez-Temble, M. Si, J. Vilhena, V. Werner, J. Wiederhold, W. Witt, P. Woods, G. Zimba
Published online 12 August 2021

Phys. Rev. C **104**, 024612
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024612
Three-body model of the d+A system in an antisymmetrized, translationally invariant many nucleon theory
R. C. Johnson
Published 16 August 2021

Phys. Rev. C **104**, 024321
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024321
Magnetic moment of the $11/2^-$ isomeric state in ^{99}Mo and neutron spin g factor quenching in A≈100 nuclei
J. M. Daugas[1,2], B. Rosse[1], D. L. Balabanski[3], D. Bucurescu[4,5], S. Kisyov[4], P. H. Regan[6,7], G. Georgiev[8], L. Gaudefroy[1,9], K. Gladnishki[10], V. Méot[1,9], P. Morel[1,9], S. Pietri[11], O. Roig[1,9], and G. S. Simpson[12]
Published 13 August 2021

Phys. Rev. C **104**, L021302
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.L021302
Evidence for enhanced neutron-proton correlations from the level structure of the N=Z+1 nucleus $^{87}_{43}Tc_{44}$
X. Liu[1,2,3,*], B. Cederwall[1], C. Qi[1], R. A. Wyss[1], Ö. Aktas[1], A. Ertoprak[1,4], W. Zhang[1], E. Clément[5], G. de France[5], D. Ralet[6], A. Gadea[7], A. Goasduff[8], G. Jaworski[8,9], I. Kuti[10], B. M. Nyakó[10], J. Nyberg[11], M. Palacz[9], R. Wadsworth[12], J. J. Valiente-Dobón[8], H. Al-Azri[13], A. Ataç Nyberg[1], T. Bäck[1], G. de Angelis[8], M. Doncel[14,15], J. Dudouet[16], A. Gottardo[6], M. Jurado[7], J. Ljungvall[6], D. Mengoni[8], D. R. Napoli[8], C. M. Petrache[17], D. Sohler[10], J. Timár[10], D. Barrientos[18], P. Bednarczyk[19], G. Benzoni[20], B. Birkenbach[21], A. J. Boston[14], H. C. Boston[14], I. Burrows[22], L. Charles[23], M. Ciemala[19], F. C. L. Crespi[24,20], D. M. Cullen[25], P. Désesquelles[26,6], C. Domingo-Pardo[7], J. Eberth[21], N. Erduran[27], S. Ertürk[28], V. González[29], J. Goupil[5], H. Hess[21], T. Huyuk[7], A. Jungclaus[30], W. Korten[31], A. Lemasson[5], S. Leoni[24,20], A. Maj[19], R. Menegazzo[32], B. Million[20], R. M. Perez-Vidal[7], Zs. Podolyàk[33], A. Pullia[24,20], F. Recchia[32], P. Reiter[21], F. Saillant[5], M. D. Salsac[31], E. Sanchis[29], J. Simpson[22], O. Stezowski[16], C. Theisen[31], and M. Zielińska[31]
Published 20 August 2021

Phys. Rev. C **104**, L021303
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.L021303
Three-quasiparticle isomers in odd-even ^{159,161}Pm: Calling for modified spin-orbit interaction for the neutron-rich region
R. Yokoyama[1,2,*], E. Ideguchi[3], G. S. Simpson[4], Mn. Tanaka[3], Yang Sun[5,†], Cui-Juan Lv[5], Yan-Xin Liu[6], Long-Jun Wang[7], S. Nishimura[8], P. Doornenbal[8], G. Lorusso[8], P.-A. Söderström[8], T. Sumikama[9], J. Wu[10,8], Z. Y. Xu[11], N. Aoi[3], H. Baba[8], F. L. Bello Garrote[12], G. Benzoni[13], F. Browne[14,8], R. Daido[15], Y. Fang[15], N. Fukuda[8], A. Gottardo[16,17], G. Gey[18,8], S. Go[2], S. Inabe[8], T. Isobe[8], D. Kameda[8], K. Kobayashi[19], M. Kobayashi[2], I. Kojouharov[20], T. Komatsubara[21,22], T. Kubo[8], N. Kurz[20], I. Kuti[23], Z. Li[10], M. Matsushita[2], S. Michimasa[2], C. B. Moon[24], H. Nishibata[15], I. Nishizuka[9], A. Odahara[15], Z. Patel[8,25], S. Rice[8,25], E. Sahin[12], H. Sakurai[8,11], H. Schaffner[26,8], L. Sinclair[26,8], H. Suzuki[8], H. Takeda[8], J. Taprogge[27,28], Zs. Vajta[23], H. Watanabe[29], and A. Yagi[15]
Published 24 August 2021

Phys. Rev. C **104**, L022803
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.L022803
Destruction of the cosmic γ-ray emitter ^{26}Al in massive stars: Study of the key ^{26}Al(n,p) reaction
C. Lederer-Woods[1,*], P. J. Woods[1], T. Davinson[1], D. Kahl[1,†], S. J. Lonsdale[1], O. Aberle[2], S. Amaducci[3,4], J. Andrzejewski[5], L. Audouin[6], M. Bacak[7,2,8], J. Balibrea[9], M. Barbagallo[10], F. Bečvář[11], E. Berthoumieux[8], J. Billowes[12], D. Bosnar[13], A. Brown[14], M. Caamaño[15], F.

Calviño[16], M. Calviani[2], D. Cano-Ott[9], R. Cardella[2], A. Casanovas[16], F. Cerutti[2], Y. H. Chen[6], E. Chiaveri[2,12,17], N. Colonna[10], G. Cortés[16], M. A. Cortés-Giraldo[17], L. Cosentino[18], S. Cristallo[19,20], L. A. Damone[10,21], M. Diakaki[8], C. Domingo-Pardo[22], R. Dressler[23], E. Dupont[8], I. Durán[15], B. Fernández-Domínguez[15], A. Ferrari[2], P. Ferreira[24], F. J. Ferrer[25], P. Finocchiaro[18], V. Furman[26], K. Göbel[27], A. R. García[9], A. Gawlik[5], S. Gilardoni[2], T. Glodariu[28], I. F. Gonçalves[24], E. González-Romero[9], E. Griesmayer[7], C. Guerrero[17], F. Gunsing[8,2], H. Harada[29], S. Heinitz[23], J. Heyse[30], D. G. Jenkins[14], E. Jericha[7], F. Käppeler[31], Y. Kadi[2], A. Kalamara[32], P. Kavrigin[7], A. Kimura[29], N. Kivel[23], M. Kokkoris[32], M. Krtička[11], D. Kurtulgil[27], E. Leal-Cidoncha[15], H. Leeb[7], J. Lerendegui-Marco[17], S. Lo Meo[33,3], D. Macina[2], A. Manna[3,4], J. Marganiec[5,34], T. Martínez[9], A. Masi[2], C. Massimi[3,4], P. Mastinu[35], M. Mastromarco[10], E. A. Maugeri[23], A. Mazzone[10,36], E. Mendoza[9], A. Mengoni[33], P. M. Milazzo[37], F. Mingrone[2], A. Musumarra[18,38], A. Negret[28], R. Nolte[34], A. Oprea[28], N. Patronis[39], A. Pavlik[40], J. Perkowski[5], I. Porras[41], J. Praena[41], J. M. Quesada[17], D. Radeck[34], T. Rauscher[42,43], R. Reifarth[27], C. Rubbia[2], J. A. Ryan[12], M. Sabaté-Gilarte[2,17], A. Saxena[44], P. Schillebeeckx[30], D. Schumann[23], P. Sedyshev[26], A. G. Smith[12], N. V. Sosnin[12], A. Stamatopoulos[32], G. Tagliente[10], J. L. Tain[22], A. Tarifeño-Saldivia[16], L. Tassan-Got[6], S. Valenta[11], G. Vannini[3,4], V. Variale[10], P. Vaz[24], A. Ventura[3], V. Vlachoudis[2], R. Vlastou[32], A. Wallner[45], S. Warren[12], C. Weiss[7], T. Wright[12], and P. Žugec[13,2] (n_TOF Collaboration)
Published 30 August 2021

Phys. Rev. C **104**, 024302
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024302
Spectroscopy of ^{98}Cd by two-nucleon removal from ^{100}In
S. Y. Jin[1,2,3,4], S. T. Wang[1,2,3,*], J. Lee[2,†], A. Corsi[5], K. Wimmer[6], F. Browne[7], S. Chen[2], M. L. Cortés[8], P. Doornenbal[7], T. Koiwai[9,7], C. X. Yuan[10], A. Algora[11,12], D. Brugnara[8,13], J. Cederkäll[14], J. Gerl[15], M. Górska[15], G. Häfner[16,17], K. Kokubun[9], P. Koseoglou[18,15], S. Kubono[7], P. Li[2], P. Liang[2], J. Liu[1,2], Z. Liu[1,3], T. Lokotko[2], J. Park[19], H. Sakurai[7,9], L. G. Sarmiento[14], Z. Y. Sun[1,3], R. Taniuchi[7,20], W. Xian[2], and I. Zanon[8]
Published 2 August 2021

Phys. Rev. C **104**, 024311
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024311
Microscopic structure of the one-phonon 2^+ states of ^{208}Po
D. Kalaydjieva[1,*], D. Kocheva[1,†], G. Rainovski[1], V. Karayonchev[2], J. Jolie[2], N. Pietralla[3], M. Beckers[2], A. Blazhev[2], A. Dewald[2], M. Djongolov[1], A. Esmaylzadeh[2], C. Fransen[2], K. A. Gladnishki[1], A. Goldkuhle[2], C. Henrich[3], I. Homm[3], K. E. Ide[3], P. R. John[3], R. Kern[3], J. Kleemann[3], Th. Kröll[3], C. Müller-Gatermann[2,‡], M. Scheck[4,5], P. Spagnoletti[4,5], M. Stoyanova[1], K. Stoychev[1], V. Werner[3], A. Yaneva[1,2], S. S. Dimitrova[6], G. De Gregorio[7,8], H. Naïdja[9], and A. Gargano[8]
Published 6 August 2021

Phys. Rev. C **104**, 024314
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024314
Decay spectroscopy of ^{50}Sc and ^{50m}Sc to ^{50}Ti
M. Bowry[1,*], C. E. Jones[1,2], A. B. Garnsworthy[1], G. C. Ball[1], S. Cruz[3,1], S. Georges[1], G. Hackman[1], J. D. Holt[1], J. Measures[1,2], B. Olaizola[1], H. P. Patel[1], C. J. Pearson[1], and C. E. Svensson[4]
Published 9 August 2021

Phys. Rev. C **104**, 024317
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024317
Low-spin states in ^{80}Ge populated in the β decay of the ^{80}Ga 3^{-} isomer
S. Sekal[1,2,*], L. M. Fraile[3,†], R. Lică[2,4], M. J. G. Borge[5], W. B. Walters[6], A. Aprahamian[7], C. Benchouk[1], C. Bernards[8,9], J. A. Briz[5], B. Bucher[10], C. J. Chiara[6,11,‡], Z. Dlouhý[12,§], I. Gheorghe[4], D. G. Ghiţă[4], P. Hoff[13], J. Jolie[8], U. Köster[14], W. Kurcewicz[15], H. Mach[3,16,§], N. Mărginean[4], R. Mărginean[4], Z. Meliani[1], B. Olaizola[2,3], V. Paziy[3], J. M. Régis[8], M. Rudigier[8], T. Sava[4], G. S. Simpson[17,18], M. Stănoiu[4], and L. Stroe[4]
Published 10 August 2021

Phys. Rev. C **104**, 024326
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024326
Laser-assisted nuclear decay spectroscopy of ^{176,177,179}Au
R. D. Harding[1,2], A. N. Andreyev[1,3,*], A. E. Barzakh[4], J. G. Cubiss[1], P. Van Duppen[5], M. Al Monthery[1], N. A. Althubiti[6,†], B. Andel[5,7], S. Antalic[7], T. E. Cocolios[5,6], T. Day Goodacre[2,6,‡], K. Dockx[5], G. J. Farooq-Smith[5,6], D. V. Fedorov[4], V. N. Fedosseev[2], D. A. Fink[2,8], L. P. Gaffney[2,9], L. Ghys[5,§], J. D. Johnson[5], D. T. Joss[9], M. Huyse[5], N. Imai[10], K. M. Lynch[2,6], B. A. Marsh[2], Y. Martinez Palenzuela[2,5], P. L. Molkanov[4], G. G. O'Neill[9,‖], R. D. Page[9], R. E. Rossel[2,11], S. Rothe[2,11], M. D. Seliverstov[4], S. Sels[5], C. Van Beveren[5], and E. Verstraelen[5]
Published 23 August 2021

Phys. Rev. C **104**, 024330
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024330
First direct observation of isomeric decay in neutron-rich odd-odd ^{186}Ta
Y. X. Watanabe[1,*], P. M. Walker[2], Y. Hirayama[1], M. Mukai[3,1,4], H. Watanabe[5,4,1], G. J. Lane[6], M. Ahmed[3,1,†], M. Brunet[2], T. Hashimoto[7], S. Ishizawa[8,1,4], S. Kimura[4], F. G. Kondev[9], Yu. A. Litvinov[10], H. Miyatake[1], J. Y. Moon[7], T. Niwase[11,1,4], M. Oyaizu[1], J. H. Park[7,‡], Zs. Podolyák[2], M. Rosenbusch[1], P. Schury[1], and M. Wada[1]
Published 27 August 2021

Phys. Rev. C **104**, 024610
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024610
First spectral measurement of deuterium-tritium fusion γ rays in inertial fusion experiments
C. J. Horsfield, M. S. Rubery, J. M. Mack, H. W. Herrmann, Y. Kim, C. S. Young, S. E. Caldwell, S. C. Evans, T. S. Sedillo, A. M. McEvoy, N. M. Hoffman, M. A. Huff, J. R. Langenbrunner, G. M. Hale, D. C. Wilson, W. Stoeffl, J. A. Church, E. M. Grafil, E. K. Miller, and V. Yu Glebov
Published 13 August 2021

Phys. Rev. C **104**, 024620
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.104.024620
High-precision proton angular distribution measurements of ^{12}C(p,p′) for the determination of the E0 decay branching ratio of the Hoyle state
K. J. Cook[1,*], A. Chevis[1], T. K. Eriksen[2,†], E. C. Simpson[2], T. Kibédi[2], L. T. Bezzina[2], A. C. Berriman[2], J. Buete[2], I. P. Carter[2], M. Dasgupta[2], D. J. Hinde[2], D. Y. Jeung[2], P. McGlynn[2], S. Parker-Steele[2,3,‡], B. M. A. Swinton-Bland[2], T. Tanaka[2], and W. Wojtaczka[2,3,§]
Published 27 August 2021

2. News to Report

a. Advanced Nuclear Skills and Innovation Campus

The pilot Advanced Nuclear Skills and Innovation Campus (ANSIC) is a first-of-its-kind programme for the nuclear sector. Funded by the Department for Business, Energy and Industrial Strategy (BEIS) and delivered by the National Nuclear Laboratory (NNL), the campus will be based at NNL's Preston Laboratory. ANSIC will unite industry and academia to collaborate on projects which help develop and commercialise advanced nuclear technologies in support of the long-term zero-carbon future.

The campus will oversee awards of £1 million into the UK industrial and academic supply chain through a variety of competitive open calls and challenges. Technical and operational support will also be provided by NNL in the delivery of successful bids.

Important on-site training and educational opportunities at the campus will help ensure the UK has the necessary skills to maintain its position at the forefront of ground-breaking nuclear research and development.

Building on the UK's long-standing nuclear expertise, ANSIC will support the nation's nuclear sector to develop operational capacity and deliver new technologies to meet the challenges of deep decarbonisation.

Two calls for innovation are now live through ANSIC. Find out more.

Contribution by Josephine Tunney (FIS360)

b. IOP Nuclear Physics Group Colloquia

October's colloquium:
7th Oct 2021 15:00 (BST)

Machine learning applications for nuclear physics experiments
https://events.iop.org/iop-nuclear-physics-group-colloquia-machine-learning-applications-nuclear-physics-experiments

Chair: Peter Pauli (University of Glasgow)
Speakers:
Richard Tyson, University of Glasgow
Naomi Jarvis, Carnegie Mellon University
Thomas Britton, Jefferson Lab

Zoom Meeting Link:
https://uofglasgow.zoom.us/j/92088932999?pwd=cTcrRXFPMjFmU2FiUW55ZEZrSVRwdz09
Meeting ID: 920 8893 2999
Passcode: 049595

September's colloquium:
9th Sep 2021 15:00 (BST)

IOP Nuclear Physics Group Colloquia - Big Bang Nucleosynthesis
https://events.iop.org/iop-nuclear-physics-group-colloquia-big-bang-nucleosynthesis

Speakers: Prof. Brian Fields, Dr. F. Cavanna, Mr. J. Marsh
Chairs: Dr Carlo Bruno

This open access colloquium will be hosted on behalf of the IOP Nuclear Physics Group by The University of Edinburgh, on Zoom:
https://ed-ac-uk.zoom.us/j/88055037309
Meeting ID: 880 5503 7309
Passcode: BBN_2021

Contribution by James Smallcombe (Liverpool)

c. Nuclear Physics Small Projects Grant Call

STFC have just launched a grant call for small nuclear physics projects. The projects should be focussed on feasibility and the proposals must relate to the strategic opportunities outlined in the Nuclear Physics roadmap. This is a two-stage application process. The first stage is an expression of interest, closing date 20th September 2021. The closing date for full applications is 2nd November 2021.

You can find more details about the call and apply here: Developing STFC nuclear physics priorities – UKRI

Contribution by Georgina Freeman (STFC)

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3. Outreach Activity

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4. Media Interactions

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