



UK Nuclear Activity

February 2020 Issue 80

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1. Nuclear Physics Publications for February (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. Scr. 95 (2020) 044004

<https://iopscience.iop.org/article/10.1088/1402-4896/ab635d>

100 years of nuclear isomers—then and now

Philip Walker¹ and Zsolt Podolyák

Published 13 February 2020

New J. Phys. 22 012001

<https://iopscience.iop.org/article/10.1088/1367-2630/ab66dd/meta>

Analytic response relativistic coupled-cluster theory: the first application to indium isotope shifts

B K Sahoo¹, A R Vernon^{2,3,11}, R F Garcia Ruiz^{4,5}, C L Binnersley², J Billowes², M L Bissell², T E Cocolios³, G J Farooq-Smith³, K T Flanagan^{2,6}, W Gins³, R P de Groote^{3,7}, Á Koszorús³, G Neyens^{3,5}, K M Lynch⁵, F Parnefjord-Gustafsson³, C M Ricketts², K D A Wendt⁸, S G Wilkins⁹ and X F Yang^{3,10}

Published 14 January 2020

Nuclear Inst. and Methods in Physics Research B 463 (2020) 384-389

<https://www.sciencedirect.com/science/article/pii/S0168583X19302356>

Optimising the Collinear Resonance Ionisation Spectroscopy (CRIS) experiment at CERN-ISOLDE

A.R.Vernon^a, R.P.de Groote^{fd}, J.Billowes^a, C.L.Binnersley^a, T.E.Cocolios^d, G.J.Farooq-Smith^d, K.T.Flanagan^{ac}, R.F.Garcia Ruiz^{ab}, W.Gins^d, Á.Koszorús^d, G.Neyens^d, C.M.Ricketts^a, A.J.Smith^a, S.G.Wilkins^a, and X.F.Yang^{fe}

Published 15 January 2020

Nuclear Inst. and Methods in Physics Research B 463 (2020) 398-402

<https://www.sciencedirect.com/science/article/pii/S0168583X19302277>

Resonance ionization schemes for high resolution and high efficiency studies of exotic nuclei at the CRIS experiment

Á.Koszorús^a, J.Billowes^b, C.L.Binnarsley^b, M.L.Bissell^b, T.E.Cocolios^a, B.S.Cooper^b, R.P.de Groot^{ac}, G.J.Farooq-Smith^a, V.N.Fedosseev^d, K.T.Flanagan^{be}, S.Franchoo^f, R.F.Garcia Ruiz^g, W.Gins^a, K.M.Lynch^g, G.Neyens^{ag}, F.P.Gustafsson^a, C.Ricketts^b, H.H.Stroke^h, A.Vernon^b, S.G.Wilkins^d, and X.F.Yang

Published 15 January 2020

Nuclear Inst. and Methods in Physics Research B 463 (2020) 375-377

<https://www.sciencedirect.com/science/article/pii/S0168583X19302381>

A compact linear Paul trap cooler buncher for CRIS

C.M.Ricketts^a, B.S.Cooper^{ab}, G.Edwards^{ab}, H.A.Perrett^{ab}, J.Billowes^a, C.L.Binnarsley^a, T.E.Cocolios^c, K.T.Flanagan^{ab}, R.F.Garcia Ruiz^d, R.P.de Groot^e, F.P.Gustafsson^c, Á.Koszorús^c, G.Neyens^{cd}, A.R.Vernon^a, and X.F.Yang

Published 15 January 2020

Phys. Rev. Lett. **124**, 042503

<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.124.042503>

Evolution of Octupole Deformation in Radium Nuclei from Coulomb Excitation of Radioactive ²²²Ra and ²²⁸Ra Beams

P. A. Butler^{1,*}, L. P. Gaffney^{1,2}, P. Spagnoletti³, K. Abrahams⁴, M. Bowry^{3,5}, J. Cederkäll⁶, G. de Angelis⁷, H. De Witte⁸, P. E. Garrett⁹, A. Goldkuhle¹⁰, C. Henrich¹¹, A. Illana⁷, K. Johnston², D. T. Joss¹, J. M. Keatings³, N. A. Kelly³, M. Komorowska¹², J. Konki², T. Kröll¹¹, M. Lozano², B. S. Nara Singh³, D. O'Donnell³, J. Ojala^{13,14}, R. D. Page¹, L. G. Pedersen¹⁵, C. Raison¹⁶, P. Reiter¹⁰, J. A. Rodriguez², D. Rosiak¹⁰, S. Rothe², M. Scheck³, M. Seidlitz¹⁰, T. M. Shneidman¹⁷, B. Siebeck¹⁰, J. Sinclair³, J. F. Smith³, M. Stryczyk⁸, P. Van Duppen⁸, S. Vinals¹⁸, V. Virtanen^{13,14}, N. Warr¹⁰, K. Wrzosek-Lipska¹², and M. Zielińska¹⁹

Published 31 January 2020

Phys. Rev. Lett. **124**, 062502

<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.124.062502>

First Exploration of Neutron Shell Structure below Lead and beyond N=126

T. L. Tang¹, B. P. Kay^{1,*}, C. R. Hoffman¹, J. P. Schiffer¹, D. K. Sharp², L. P. Gaffney³, S. J. Freeman², M. R. Mumpower^{4,5}, A. Arokiaraj⁶, E. F. Baader³, P. A. Butler⁷, W. N. Catford⁸, G. de Angelis⁹, F. Flavigny^{10,11}, M. D. Gott¹, E. T. Gregor⁹, J. Konki³, M. Labiche¹², I. H. Lazarus¹², P. T. MacGregor², I. Martel⁷, R. D. Page⁷, Zs. Podolyák⁸, O. Poleshchuk⁶, R. Raabe⁶, F. Recchia^{13,14}, J. F. Smith¹⁵, S. V. Szewc^{16,17}, and J. Yang⁶

Published 13 February 2020

Phys. Rev. Lett. **124**, 062501

<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.124.062501>

Isospin Properties of Nuclear Pair Correlations from the Level Structure of the Self-Conjugate ⁸⁸Ru Nucleus

B. Cederwall^{1,*}, X. Liu¹, Ö. Aktas¹, A. Ertoprak^{1,2}, W. Zhang¹, C. Qi¹, E. Clément³, G. de France³, D. Ralet⁴, A. Gadea⁵, A. Goasduff⁶, G. Jaworski^{6,7}, I. Kuti⁸, B. M. Nyakó⁸, J. Nyberg⁹, M. Palacz⁷, R. Wadsworth¹⁰, J. J. Valiente-Dobón⁶, H. Al-Azri¹¹, A. Ataç Nyberg¹, T. Bäck¹, G. de Angelis⁶, M. Doncel^{1,12}, J. Dudouet¹³, A. Gottardo⁴, M. Jurado⁵, J. Ljungvall⁴, D. Mengoni⁶, D. R. Napoli⁶, C. M. Petrache⁴, D. Sohler⁸, J. Timár⁸, D. Barrientos¹⁴, P. Bednarczyk¹⁵, G. Benzoni¹⁶, B. Birkenbach¹⁷, A. J. Boston¹⁸, H. C. Boston¹⁸, I. Burrows¹⁹, L. Charles²⁰, M. Ciemala¹⁵, F. C. L. Crespi^{21,22}, D. M. Cullen²³, P. Désesquelles^{24,25}, C. Domingo-

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Published 12 February 2020

Phys. Rev. Lett. **124**, 082301

<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.124.082301>

Measurement of Azimuthal Anisotropy of Muons from Charm and Bottom Hadrons in pp Collisions at $\sqrt{s}=13$ TeV with the ATLAS Detector

G. Aad *et al.* (ATLAS Collaboration)

Published 26 February 2020

Phys. Rev. C **101**, 021302(R)

<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.101.021302>

Stringent upper limit on the direct 3α decay of the Hoyle state in ^{12}C

R. Smith, M. Gai, M. W. Ahmed, M. Freer, H. O. U. Fynbo, D. Schweitzer, and S. R. Stern

Published 19 February 2020

Phys. Rev. C **101**, 021303(R)

<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.101.021303>

Testing *ab initio* nuclear structure in neutron-rich nuclei: Lifetime measurements of second 2^+ state in ^{16}C and ^{20}O

[M. Ciemala^{1,*}, S. Ziliani^{2,3}, F. C. L. Crespi^{2,3}, S. Leoni^{2,3,+}, B. Fornal^{1,+}, A. Maj¹, P. Bednarczyk¹, G. Benzoni³, A. Bracco^{2,3}, C. Boiano³, S. Bottoni^{2,3}, S. Brambilla³, M. Bast⁴, M. Beckers⁴, T. Braunroth⁴, F. Camera^{2,3}, N. Cieplicka-Oryńczak¹, E. Clément⁵, S. Coelli³, O. Dorvaux⁶, S. Erturk⁷, G. de France⁵, C. Fransen⁴, A. Goldkuhle⁴, J. Grębosz¹, M. N. Harakeh⁸, Ł. W. Iskra^{1,3}, B. Jacquot⁵, A. Karpov⁹, M. Kicińska-Habior¹⁰, Y. Kim⁵, M. Kmiecik¹, A. Lemasson⁵, S. M. Lenzi^{11,12}, M. Lewitowicz⁵, H. Li⁵, I. Matea¹³, K. Mazurek¹, C. Michelagnoli¹⁴, M. Matejska-Minda^{15,1}, B. Million³, C. Müller-Gatermann⁴, V. Nana¹⁶, P. Napiorkowski¹⁵, D. R. Napoli¹⁷, R. Palit¹⁶, M. Rejmund⁵, Ch. Schmitt⁶, M. Stanoiu¹⁸, I. Stefan¹³, E. Vardaci¹⁹, B. Wasilewska¹, O. Wieland³, M. Zieblinski¹, M. Zielińska²⁰, A. Ataç²¹, D. Barrientos²², B. Birkenbach⁴, A. J. Boston²³, B. Cederwall²¹, L. Charles⁶, J. Collado²⁴, D. M. Cullen²⁵, P. Désesquelles²⁶, C. Domingo-Pardo²⁷, J. Dudouet²⁸, J. Eberth⁴, V. González²⁴, J. Goupil⁵, L. J. Harkness-Brennan²³, H. Hess⁴, D. S. Judson²³, A. Jungclaus²⁹, W. Korten²⁰, M. Labiche³⁰, A. Lefevre⁵, R. Menegazzo¹¹, D. Mengoni^{11,12}, J. Nyberg³¹, R. M. Perez-Vidal²⁷, Zs. Podolyak³², A. Pullia^{2,3}, F. Recchia^{11,12}, P. Reiter⁴, F. Saillant⁵, M. D. Salsac²⁰, E. Sanchis²⁴, O. Stezowski²⁸, Ch. Theisen²⁰, J. J. Valiente-Dobón¹⁷, J. D. Holt^{33,34}, J. Menéndez^{35,36}, A. Schwenk^{37,38,39}, and J. Simonis⁴⁰](#)

Published 27 February 2020

Phys. Rev. C **101**, 024306

<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.101.024306>

Isomeric $13/2^+$ state in ^{201}Fr

K. Auranen, U. Jakobsson, H. Badran, T. Grahn, P. T. Greenlees, A. Herzáň, R. Julin, S. Juutinen, J. Konki, M. Leino, A.-P. Leppänen, G. O'Neill, J. Pakarinen, P. Papadakis, J. Partanen, P. Rahkila, P. Ruotsalainen, M. Sandzelius, J. Sarén, C. Scholey, L. Sinclair, J. Sorri, S. Stolze, J. Uusitalo, and A. Voss

Published 18 February 2020

Phys. Rev. C **101**, 024313

<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.101.024313>

Half-life measurements in ^{164,166}Dy using γ - γ fast-timing spectroscopy with the ν -Ball spectrometer

[R. L. Canavan](#)^{1,2,*}, [M. Rudigier](#)^{1,3}, [P. H. Regan](#)^{1,2}, [M. Lebois](#)^{4,5}, [J. N. Wilson](#)^{4,5}, [N. Jovancevic](#)^{4,5}, [P.-A. Söderström](#)⁶, [S. M. Collins](#)^{1,2}, [D. Thisse](#)^{4,5}, [J. Benito](#)⁷, [S. Bottoni](#)⁸, [M. Brunet](#)¹, [N. Cieplicka-Oryńczak](#)⁹, [S. Courtin](#)¹⁰, [D. T. Doherty](#)¹, [L. M. Fraile](#)⁷, [K. Hadyńska-Kleń](#)^{1,11}, [G. Häfner](#)^{12,13}, [M. Heine](#)¹⁰, [Ł. W. Iskra](#)^{8,9}, [V. Karayonchev](#)¹³, [A. Kennington](#)¹, [P. Koseoglou](#)^{3,14}, [G. Lotay](#)¹, [G. Lorusso](#)^{1,2}, [M. Nakhostin](#)¹, [C. R. Niță](#)¹⁵, [S. Oberstedt](#)¹⁶, [Zs. Podolyák](#)¹, [L. Qi](#)^{4,5}, [J.-M. Régis](#)¹³, [V. Sánchez-Tembleque](#)⁷, [R. Shearman](#)², [V. Vedia](#)⁷, and [W. Witt](#)^{3,14}

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Phys. Rev. C **101**, 024906

<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.101.024906>

Measurement of the azimuthal anisotropy of charged-particle production in Xe+Xe collisions at $\sqrt{s_{nn}}=5.44$ TeV with the ATLAS detector

[G. Aad](#) *et al.* (ATLAS Collaboration)

Published 10 February 2020

Phys. Rev. C **101**, 025803

<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.101.025803>

Mass measurements of neutron-rich gallium isotopes refine production of nuclei of the first r -process abundance peak in neutron-star merger calculations

[M. P. Reiter](#)^{1,2,*}, [S. Ayet San Andrés](#)^{1,3,†}, [S. Nikas](#)^{3,4}, [J. Lippuner](#)^{5,6,7}, [C. Andreoiu](#)⁸, [C. Babcock](#)², [B. R. Barquest](#)², [J. Bollig](#)^{2,9}, [T. Brunner](#)^{2,10}, [T. Dickel](#)^{1,3}, [J. Dilling](#)^{2,11}, [I. Dillmann](#)^{2,12}, [E. Dunling](#)^{2,13}, [G. Gwinner](#)¹⁴, [L. Graham](#)², [C. Hornung](#)¹, [R. Klawitter](#)^{2,15}, [B. Kootte](#)^{2,14}, [A. A. Kwiatkowski](#)^{2,12}, [Y. Lan](#)^{2,11}, [D. Lascar](#)^{2,16}, [K. G. Leach](#)¹⁷, [E. Leistenschneider](#)^{2,11}, [G. Martínez-Pinedo](#)^{3,4}, [J. E. McKay](#)^{2,12}, [S. F. Paul](#)^{2,9}, [W. R. Plaß](#)^{1,3}, [L. Roberts](#)¹⁸, [H. Schatz](#)^{7,18,19}, [C. Scheidenberger](#)^{1,3}, [A. Sieverding](#)^{3,4,20}, [R. Steinbrügge](#)^{2,‡}, [R. Thompson](#)²¹, [M. E. Wieser](#)²¹, [C. Will](#)¹, and [D. Welch](#)¹⁸

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2. News to Report

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