# UK Nuclear Activity

April 2019 Issue 70

In this issue,



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***1. Nuclear Physics Publications for April****

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 **99**, 041301(R) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.041301

***Collective rotation of an oblate nucleus at very high spin***

C. M. Petrache[1], S. Frauendorf[2], B. F. Lv[1], A. Astier[1], E. Dupont[1], S. Guo[3], M. L. Liu[3], X. H. Zhou[3], K. L. Wang[3], P. T. Greenlees[4], H. Badran[4], D. M. Cox[4,*], T. Grahn[4], R. Julin[4], S. Juutinen[4], J. Konki[4,†], J. Pakarinen[4], P. Papadakis[4,‡], J. Partanen[4], P. Rahkila[4], M. Sandzelius[4], J. Saren[4], C. Scholey[4], J. Sorri[4,§], S. Stolze[4,‖], J. Uusitalo[4], B. Cederwall[5], Ö. Aktas[5], A. Ertoprak[5], H. Liu[5], I. Kuti[6], J. Timár[6], A. Tucholski[7], J. Srebrny[7], and C. Andreoiu[8]

Published 1 April 2019

Phys. Rev. C **99**, 044306 https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.044306

***Shape staggering of midshell mercury isotopes from in-source laser spectroscopy compared with density-functional-theory and Monte Carlo shell-model calculations***

S. Sels[1,*], T. Day Goodacre[2,3], B. A. Marsh[3], A. Pastore[4], W. Ryssens[5], Y. Tsunoda[6], N. Althubiti[2], B. Andel[7], A. N. Andreyev[4,8], D. Atanasov[9], A. E. Barzakh[10], M. Bender[5], J. Billowes[2], K. Blaum[9], T. E. Cocolios[1], J. G. Cubiss[4], J. Dobaczewski[4,11], G. J. Farooq-Smith[1], D. V. Fedorov[10], V. N. Fedosseev[3], K. T. Flanagan[2], L. P. Gaffney[12,1], L. Ghys[13,1], P.-H. Heenen[14], M. Huyse[1], S. Kreim[9], D. Lunney[15], K. M. Lynch[3], V. Manea[9], Y. Martinez Palenzuela[1], T. M. Medonca[3], P. L. Molkanov[10], T. Otsuka[6,16,1], J. P. Ramos[3,17], R. E. Rossel[3,18], S. Rothe[3], L. Schweikhard[19], M. D. Seliverstov[10], P. Spagnoletti[12], C. Van Beveren[1], P. Van Duppen[1], M. Veinhard[3], E. Verstraelen[1], A. Welker[20], K. Wendt[18], F. Wienholtz[19], R. N. Wolf[9], and A. Zadvornaya

Published 12 April 2019

*Also includes missed publications from previous months

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Phys. Rev. C **99**, 044608
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.044608
***Antisymmetrized, translationally invariant theory of the nucleon optical potential***
R. C. Johnson
Published 18 April 2019

Phys. Rev. C **99**, 044310
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.044310
***β decay of $^{127}$Cd and excited states in $^{127}$In***
Ch. Lorenz[1], L. G. Sarmiento[1], D. Rudolph[1], P. Golubev[1], T. Eronen[2], D. A. Nesterenko[2], A. Kankainen[2], L. Canete[2], D. M. Cox[1,2], A. Fernandez[3], U. Forsberg[1,2,4], A. Jungclaus[3], I. Kojouharov[5], N. Kurz[5], N. Lalović[1], J. Partanen[2], M. Reponen[2], S. Rinta-Antila[2], A. de Roubin[2], A. Såmark-Roth[1], V. Vaquero[3], and M. Vilén[2]
Published 19 April 2019

Phys. Rev. C **99**, 044312
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.044312
***Effect of the Coulomb energy on Skyrmions***
Nana Ma[1], Chris James Halcrow[2], and Hongfei Zhang[1,*]
Published 22 April 2019

Phys. Rev. C **99**, 044317
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.044317
***Probing isospin symmetry in the ($^{50}$Fe, $^{50}$Mn, $^{50}$Cr) isobaric triplet via electromagnetic transition rates***
M. M. Giles[1], B. S. Nara Singh[1,2,*], L. Barber[1], D. M. Cullen[1], M. J. Mallaburn[1], M. Beckers[3], A. Blazhev[3], T. Braunroth[3], A. Dewald[3], C. Fransen[3], A. Goldkuhle[3], J. Jolie[3], F. Mammes[3], C. Müller-Gatermann[3], D. Wölk[3], K. O. Zell[3], S. M. Lenzi[4], and A. Poves[5]
Published 26 April 2019

Phys. Rev. C **99**, 045805
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.045805
***β decay and β-delayed neutron decay of the N=82 nucleus $^{131}_{49}In_{82}$***
R. Dunlop[1,*], C. E. Svensson[1], C. Andreoiu[2], G. C. Ball[3], N. Bernier[3,4], H. Bidaman[1], V. Bildstein[1], M. Bowry[3], D. S. Cross[2], I. Dillmann[3,5], M. R. Dunlop[1], F. H. Garcia[2], A. B. Garnsworthy[3], P. E. Garrett[1], G. Hackman[3], J. Henderson[3,†], J. Measures[3,6], D. Mücher[1], B. Olaizola[1,3], K. Ortner[2], J. Park[3,4,‡], C. M. Petrache[7], J. L. Pore[2,§], J. K. Smith[3,‖], D. Southall[3,¶], M. Ticu[2], J. Turko[1], K. Whitmore[2], and T. Zidar[1]
Published 26 April 2019

Phys. Rev. C **99**, 044320
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.044320
***Shell evolution approaching the N=20 island of inversion: Structure of $^{29}$Mg***
A. Matta[1,2,*], W. N. Catford[1], N. A. Orr[2], J. Henderson[3], P. Ruotsalainen[3], G. Hackman[3], A. B. Garnsworthy[3], F. Delaunay[2], R. Wilkinson[1], G. Lotay[1], Naofumi Tsunoda[4], Takaharu Otsuka[4,5], A. J. Knapton[1], G. C. Ball[3], N. Bernier[6,3], C. Burbadge[7], A. Chester[8], D. S. Cross[8], S. Cruz[6,3], C. Aa. Diget[9], T. Domingo[8], T. E. Drake[10], L. J. Evitts[3,1], F. H. Garcia[8], S. Hallam[1,3], E. MacConnachie[3], M. Moukaddam[1,3], D. Muecher[7], E. Padilla-Rodal[11], O. Paetkau[3], J. Park[6,3], J. L. Pore[8], U. Rizwan[8], J. Smallcombe[3], J. K. Smith[3], K. Starosta[8], C. E. Svensson[7], J. Williams[8], and M. Williams[3,9]
Published 29 April 2019

J. High Energ. Phys. (2019) 2019: 169
https://link.springer.com/article/10.1007/JHEP03%282019%29169
***Jet fragmentation transverse momentum measurements from di-hadron correlations in $\sqrt{s}$ = 7 TeV pp and $\sqrt{s_{NN}}$ = 5.02 TeV p–Pb collisions***
ALICE Collaboration, UK Authors: H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, K. L. Graham, C. Hills, J.P. Iddon, O. Jevons, P. G. Jones, A. Jusko, M. Krivda, J. Kvapil, R. C. Lemmon, R. Lietava, S. W. Lindsay, J. Norman, O. Villalobos Baillie, E. Willsher, N. Zardoshti
Published 26 March 2019

Eur. Phys. J. C (2019) 79: 307
https://link.springer.com/article/10.1140/epjc/s10052-019-6801-9
***Charged-particle pseudorapidity density at mid-rapidity in p–Pb collisions at $\sqrt{s_{NN}}$ = 8.16 TeV***
ALICE Collaboration, UK Authors: H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, K. L. Graham, C. Hills, J.P. Iddon, O. Jevons, P. G. Jones, A. Jusko, M. Krivda, J. Kvapil, R. C. Lemmon, R. Lietava, S. W. Lindsay, J. Norman, O. Villalobos Baillie, E. Willsher, N. Zardoshti
Published 04 April 2019

New J. Phys. **21**, 043010 (2019)
https://doi.org/10.1088/1367-2630/ab0e58
***Conditional Recovery of Time-reversal Symmetry in Many-nucleus Systems***
Yoritaka Iwata and Paul Stevenson
Published 08 April 2019

Phys. Rev. Lett. **122**, 162301
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.122.162301
***First Measurements of the Double-Polarization Observables F, P, and H in ω Photoproduction off Transversely Polarized Protons in the $N^*$ Resonance Region***
P. Roy[14,†], S. Park[14,††], V. Crede[14,*], A. V. Anisovich[3,49], E. Klempt[3], V. A. Nikonov[3,49], A. V. Sarantsev[3,49], N. C. Wei[48,50], F. Huang[50], K. Nakayama[17], K. P. Adhikari[34,c], S. Adhikari[13], G. Angelini[16], H. Avakian[40], L. Barion[19], M. Battaglieri[21], I. Bedlinskiy[26], A. S. Biselli[11], S. Boiarinov[40], W. J. Briscoe[16], J. Brock[40], W. K. Brooks[41], V. D. Burkert[40], F. Cao[9], C. Carlin[40], D. S. Carman[40], A. Celentano[21], P. Chatagnon[24], T. Chetry[33], G. Ciullo[12,19], P. L. Cole[18,29], M. Contalbrigo[19], O. Cortes[16], A. D'Angelo[22,36], N. Dashyan[47], R. De Vita[21], E. De Sanctis[20], A. Deur[40], S. Diehl[9], C. Djalali[33,38], M. Dugger[2], R. Dupre[1,24], B. Duran[39], H. Egiyan[31,40], M. Ehrhart[24], A. El Alaoui[41], L. El Fassi[30], P. Eugenio[14], S. Fegan[42,§], A. Filippi[23], A. Fradi[24,‖], G. P. Gilfoyle[35], F. X. Girod[7,40], E. Golovatch[37], R. W. Gothe[38], K. A. Griffioen[46], M. Guidal[24], L. Guo[13,40], K. Hafidi[1], C. Hanretty[14,40], N. Harrison[40], M. Hattawy[34], T. B. Hayward[46], D. Heddle[8,40], K. Hicks[33], M. Holtrop[31], Y. Ilieva[16,38], D. G. Ireland[42], B. S. Ishkhanov[37], E. L. Isupov[37], D. Jenkins[44], H. S. Jo[28], S. Johnston[1], S. Joosten[39], M. L. Kabir[30], C. D. Keith[40], D. Keller[45], G. Khachatryan[47], M. Khachatryan[34], A. Khanal[13], M. Khandaker[32,¶], A. Kim[9], W. Kim[28], F. J. Klein[6], V. Kubarovsky[40], S. V. Kuleshov[26,41], M. C. Kunkel[25], L. Lanza[22], P. Lenisa[19], K. Livingston[42], I. J. D. MacGregor[42], D. Marchand[24], B. McKinnon[42], D. G. Meekins[40], C. A. Meyer[5], T. Mineeva[41], V. Mokeev[37,40], R. A. Montgomery[42], A. Movsisyan[19], C. Munoz Camacho[24], P. Nadel-Turonski[40], S. Niccolai[24], G. Niculescu[27], M. Osipenko[21], A. I. Ostrovidov[14], M. Paolone[39,38], L. L. Pappalardo[19], R. Paremuzyan[31,47], E. Pasyuk[40], D. Payette[34], W. Phelps[16], J. Pierce[45,**], O. Pogorelko[26], Y. Prok[8,34,45], D. Protopopescu[42], B. A. Raue[13,40], M. Ripani[21], D. Riser[9], B. G. Ritchie[2], A. Rizzo[22,36], G. Rosner[42], F. Sabatié[7], C. Salgado[32], R. A. Schumacher[5], M. L. Seely[40], Y. G. Sharabian[40], U. Shrestha[33], Iu. Skorodumina[37,38], D. Sokhan[42], O. Soto[41], N. Sparveris[39], I. I. Strakovsky[16], S. Strauch[38], M. Taiuti[15,††], J. A. Tan[28], B. Torayev[34], N. Tyler[38], M. Ungaro[9,40], H. Voskanyan[47], E. Voutier[24], N. K. Walford[6], R. Wang[24], D. P. Watts[43], X. Wei[40], M. H. Wood[4], N. Zachariou[16,43], J. Zhang[34,45], and Z. W. Zhao[10,38,45]
Published 23 April 2019

Phys. Rev. Lett. **122**, 162503
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.122.162503
***Prominence of Pairing in Inclusive (p,2p) and (p,pn) Cross Sections from Neutron-Rich Nuclei***
N. Paul[1,2,*], A. Obertelli[3,1,2], C. A. Bertulani[4], A. Corsi[1], P. Doornenbal[2], J. L. Rodriguez-Sanchez[1,5], G. Authelet[1], H. Baba[2], D. Calvet[1], F. Château[1], S. Chen[6,2], A. Delbart[1], J.-M. Gheller[1], A. Giganon[1], A. Gillibert[1], T. Isobe[2], V. Lapoux[1], M. Matsushita[7], S. Momiyama[2,8], T. Motobayashi[2], M. Niikura[8], H. Otsu[2], C. Péron[1], A. Peyaud[1], E. C.

Pollacco[1], J.-Y. Roussé[1], H. Sakurai[2,8], C. Santamaria[1,2,9], M. Sasano[2], Y. Shiga[10], D. Steppenbeck[2], S. Takeuchi[2], R. Taniuchi[2,8], T. Uesaka[2], H. Wang[2], K. Yoneda[2], T. Ando[2,8], T. Arici[5,11], A. Blazhev[12], F. Browne[13], A. M. Bruce[13], R. Carroll[14], L. X. Chung[15], M. L. Cortés[3,5,2], M. Dewald[12], B. Ding[16], Zs. Dombradi[17], F. Flavigny[18], S. Franchoo[18], F. Giacoppo[19], M. Górska[5], A. Gottardo[18], K. Hadynska-Klek[19], Z. Korkulu[17], S. Koyama[2,8], Y. Kubota[2,7], A. Jungclaus[20], J. Lee[21], M. Lettmann[3], B. D. Linh[15], J. Liu[21], Z. Liu[16], C. Lizarazo[5,3], C. Louchart[3], R. Lozeva[22,23], K. Matsui[2,8], T. Miyazaki[2,8], K. Moschner[12], S. Nagamine[8,2], N. Nakatsuka[24], C. Nita[25], S. Nishimura[2], C. R. Nobs[13], L. Olivier[18], S. Ota[7], Z. Patel[14], Zs. Podolyák[14], M. Rudigier[14], E. Sahin[19], T. Y. Saito[8,2], C. Shand[14], P.-A. Söderström[2,26], I. G. Stefan[18], T. Sumikama[27], D. Suzuki[18], R. Orlandi[28], V. Vaquero[20], Zs. Vajta[17], V. Werner[3], K. Wimmer[8], J. Wu[2,6], and Z. Xu[21]

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***2. News to Report***

**a. IOP Nuclear Physics Group Early Career Prize Winner 2018**

Dr Robert Shearman (pictured below) has been awarded the IOP Nuclear Physics Group Early Career Prize 2018.

Rob graduated from the University of Surrey in 2018. His nomination is for making very significant contributions to the fields of nuclear structure and radionuclide metrology. His work has acted as an important link between applications of nuclear science and curiosity-led nuclear structure-based research. Rob contributed to the development of the National Nuclear Array (NANA) at NPL for primary radionuclide standardisation and in parallel analysed data on experimental fission yields and beta-delayed neutron emission from the most neutron-rich rhodium and silver isotopes.

On behalf of the IOP NPG committee congratulations to Rob and a big thanks to Dan Doherty for nominating him. As part of the award Rob will give a presentation at the INPC in Glasgow later this year.

*Contribution by Tzany Kokalova Wheldon (Chair of the IOP Nuclear Physics Group)*
*t.kokalova@bham.ac.uk*

**b. Nuclear Fission and Structure of Exotic Nuclei Workshop**

The 54th ASRC International Workshop Sakura-2019 "*Nuclear Fission and Structure of Exotic Nuclei*" was held at Advanced Science Research Center (ASRC), of Japan Atomic Energy Agency (JAEA), in Tokai, Japan on 25-28th March, 2019.

This was the 8th workshop at ASRC, co-organized by Prof. Andrei Andreyev from the Nuclear Physics Group of the University of York and his colleague Dr. Katsuhisa Nishio from JAEA. Close to 70 participants from across the world attended the event, delivering 50 talks over 3 days. The meeting was mainly devoted to new experimental and theoretical achievements in fission, super-heavy nuclei, nuclear reactions and structure of exotic nuclei. Especially, the JAEA group is driving a dedicated program using the very rare target material, einsteinium-254 (half-life 275 days), for which new results and new proposals were discussed.

Contribution by Andrei Andreyev
(University of York)
*andrei.andreyev@york.ac.uk*

**c. STFC-funded Global Challenge discussions continue at iThemba LABS, South Africa**

The 2nd edition of the workshop on Advanced Nuclear Science and Technology Techniques (ANSTT) was held at iThemba LABS in March. The 3-day workshop focused on metrology and applications, environmental measurements and nuclear structure studies at iThemba LABS with one day being dedicated to each topic. Round-table discussions on each of the first two days helped to foster collaboration and develop plans for future work and joint PhD student programmes.

60 participants attended from countries including Botswana, Cameroon, Tanzania and Nigeria with Eswatini appearing on the list of countries for the first time. Some participants were funded to attend by the IAEA. The UK delegation included representatives from the Universities of Brighton, Liverpool, Surrey and York as well as the National Physical Laboratory. The workshop was hosted by iThemba LABS and partially funded by the UK STFC's Global Challenge Research Fund.


*Contribution by Alison Bruce (University of Brighton)*
*alison.bruce@brighton.ac.uk*

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***3. Outreach Activity***

**Binding Blocks (LEGO) Team Training**

On Tuesday 4th June, this year's (LEGO) Binding Blocks Team Training Day is taking place at the National STEM Learning Centre. If you are interested, please sign up to the event through the link below. The event is particularly targeted to undergraduates and post-graduates who are interested in outreach, science communication, teaching, and/or nuclear physics research. Staff members are, however, very welcome to participate as well!
https://york.qualtrics.com/jfe/form/SV_bruDohgdbXq5e4Z

There will also be opportunities to highlight your own workshops, please see the sign-up form for details. Participation, refreshments, and lunch is free.

*Contribution by Christian Aa. Diget (University of York)*
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**4. Media Interactions**

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