UK Nuclear Activity

September 2019 Issue 75

In this issue,

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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 **100**, 031302(R)
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.031302

Strong one-neutron emission from two-neutron unbound states in β decays of the r-process nuclei ^{86,87}Ga

R. Yokoyama[1,*], R. Grzywacz[1,2], B. C. Rasco[2,1], N. Brewer[2,1], K. P. Rykaczewski[2], I. Dillmann[3], J. L. Tain[4], S. Nishimura[5], D. S. Ahn[5], A. Algora[4,6], J. M. Allmond[2], J. Agramunt[4], H. Baba[5], S. Bae[7], C. G. Bruno[8], R. Caballero-Folch[3], F. Calvino[9], P. J. Coleman-Smith[10], G. Cortes[9], T. Davinson[8], C. Domingo-Pardo[4], A. Estrade[11], N. Fukuda[5], S. Go[5], C. J. Griffin[8], J. Ha[7,5], O. Hall[8], L. J. Harkness-Brennan[12], J. Heideman[1], T. Isobe[5], D. Kahl[8], M. Karny[13], T. Kawano[14], L. H. Khiem[15], T. T. King[1], G. G. Kiss[5,6], A. Korgul[13], S. Kubono[5], M. Labiche[10], I. Lazarus[10], J. Liang[16], J. Liu[17,5], G. Lorusso[18,19,5], M. Madurga[1], K. Matsui[5,20], K. Miernik[13], F. Montes[21], A. I. Morales[4], P. Morrall[10], N. Nepal[11], R. D. Page[12], V. H. Phong[5,22], M. Piersa[13], M. Prydderch[23], V. F. E. Pucknell[10], M. M. Rajabali[24], B. Rubio[4], Y. Saito[3], H. Sakurai[5], Y. Shimizu[5], J. Simpson[10], M. Singh[1], D. W. Stracener[2], T. Sumikama[5], R. Surman[25], H. Suzuki[5], H. Takeda[5], A. Tarifeño-Saldivia[9], S. L. Thomas[23], A. Tolosa-Delgado[4], M. Wolińska-Cichocka[26], P. J. Woods[8], and X. X. Xu[17]

Published 19 September 2019

Phys. Rev. C **100**, 034306
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034306

Normal and intruder configurations in ^{34}Si populated in the β^- decay of ^{34}Mg and ^{34}Al

R. Lică[1,2], F. Rotaru[1], M. J. G. Borge[2,3], S. Grévy[4,5], F. Negoiță[1], A. Poves[6,7], O. Sorlin[4], A. N. Andreyev[8], R. Borcea[1], C. Costache[1], H. De Witte[9], L. M. Fraile[10], P. T. Greenlees[11,12], M. Huyse[9], A. Ionescu[1,13], S. Kisyov[14,1], J. Konki[11,12,2], I. Lazarus[15], M. Madurga[2], N. Mărginean[1], R. Mărginean[1], C. Mihai[1], R. E. Mihai[1], A. Negret[1], F. Nowacki[16,17], R. D. Page[18], J. Pakarinen[11,12], V. Pucknell[15], P. Rahkila[11,12], E. Rapisarda[2,19], A. Şerban[1], C. O. Sotty[1], L. Stan[1], M. Stănoiu[1], O. Tengblad[3], A. Turturică[1], P. Van Duppen[9], N. Warr[20], Ph. Dessagne[21], T. Stora[22], C. Borcea[1], S. Călinescu[1], J. M. Daugas[23], D. Filipescu[1], I. Kuti[24], S. Franchoo[25], I. Gheorghe[1], P. Morfouace[25,23], P. Morel[23], J. Mrazek[26], D. Pietreanu[1], D. Sohler[27], I. Stefan[25], R. Şuvăilă[1], S. Toma[1], and C. A. Ur[1,28]
Published 11 September 2019

Phys. Rev. C **100**, 024002
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024002

One-dimensional charged kaon femtoscopy in p-Pb collisions at $\sqrt{s_{NN}}$ = 5.02 TeV

ALICE Collaboration, UK Authors: H.A. Andrews, L.S. Barnby, M. Borri, M.D. Buckland, M. Chartier, G. Contin, 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, S. Ragoni, O. Villalobos Baillie, E.Willsher, N. Zardoshti
Published 22 August 2019

Phys. Rev. C **100**, 034304
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034304

Precision measurements of the charge radii of potassium isotopes

Á. Koszorús, X. F. Yang, J. Billowes, C. L. Binnersley, M. L. Bissell, T. E. Cocolios, G. J. Farooq-Smith, R. P. de Groote, K. T. Flanagan, S. Franchoo, R. F. Garcia Ruiz, S. Geldhof, W. Gins, A. Kanellakopoulos, K. M. Lynch, G. Neyens, H. H. Stroke, A. R. Vernon, K. D. A. Wendt, and S. G. Wilkins
Published 9 September 2019

Phys. Rev. C **100**, 034315
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034315

Search for α decay of ^{104}Te with a novel recoil-decay scintillation detector

Y. Xiao[1], S. Go[1,2], R. Grzywacz[1,3], R. Orlandi[4], A. N. Andreyev[4,5], M. Asai[4], M. A. Bentley[5], G. de Angelis[6], C. J. Gross[3], P. Hausladen[3], K. Hirose[4], S. Hofmann[7], H. Ikezoe[4], D. G. Jenkins[5], B. Kindler[7], R. Léguillon[4], B. Lommel[7], H. Makii[4], C. Mazzocchi[8], K. Nishio[4], P. Parkhurst[9], S. V. Paulauskas[1], C. M. Petrache[10], K. P. Rykaczewski[3], T. K. Sato[4], J. Smallcombe[4], A. Toyoshima[4], K. Tsukada[4], K. Vaigneur[11], and R. Wadsworth
Published 16 September 2019

Phys. Rev. C **100**, 034317
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034317

Probing the role of proton cross-shell excitations in ^{70}Ni using nucleon knockout reactions

B. Elman[1,2], A. Gade[1,2], R. V. F. Janssens[3], A. D. Ayangeakaa[4], D. Bazin[1,2], J. Belarge[1], P. C. Bender[1,*], B. A. Brown[1,2], C. M. Campbell[5], M. P. Carpenter[6], H. L. Crawford[5], B. P. Crider[1,†], P. Fallon[5], A. M. Forney[7], J. Harker[6,7], S. N. Liddick[1,8], B. Longfellow[1,2], E. Lunderberg[1,2], C. J. Prokop[1,8], J. Sethi[7], R. Taniuchi[5,9,10,‡], W. B. Walters[7], D. Weisshaar[1], and S. Zhu[6,§]
Published 18 September 2019

Phys. Rev. C **100**, 034320
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034320

Experimental investigation of α condensation in light nuclei

J. Bishop[1,*], Tz. Kokalova[1], M. Freer[1], L. Acosta[2,3], M. Assié[4], S. Bailey[1], G. Cardella[2], N. Curtis[1], E. De Filippo[2], D. Dell'Aquila[5,6], S. De Luca[2,7], L. Francalanza[5], B. Gnoffo[2,8], G. Lanzalone[9,10], I. Lombardo[2], N. S. Martorana[8,9], S. Norella[2,7], A. Pagano[2], E. V. Pagano[9], M. Papa[2], S. Pirrone[2], G. Politi[2,8], F. Rizzo[9,8], P.

Russotto[2], L. Quattrocchi[2,7], R. Smith[1], I. Stefan[4], A. Trifirò[2,7], M. Trimarchì[2,7], G. Verde[4,2], M. Vigilante[5], and C. Wheldon[1]
Published 20 September 2019

Phys. Rev. C **100**, 034322
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034322
Spectroscopy of low-spin states in ^{157}Dy: Search for evidence of enhanced octupole correlations
S. N. T. Majola[1,2,3,*], R. A. Bark[3], L. Bianco[12], T. D. Bucher[3], S. P. Bvumbi[2], D. M. Cullen[4,7], P. E. Garrett[12], P. T. Greenlees[4], D. Hartley[8], J. Hirvonen[4], U. Jakobsson[4], P. M. Jones[3], R. Julin[4], S. Juutinen[4], S. Ketelhut[4], B. V. Kheswa[2,3], A. Korichi[13], E. A. Lawrie[3,5], P. L. Masiteng[2], B. Maqabuka[3], L. Mdletshe[1,3], A. Minkova[14], J. Ndayishimye[3], P. Nieminen[4], R. Newman[3], B. M. Nyakó[9], S. S. Ntshangase[1], P. Peura[4], P. Rahkila[4], L. L. Riedinger[10], M. Riley[6], D. Roux[11], P. Ruotsalainen[4], J. Saren[4], J. F. Sharpey-Schafer[5], C. Scholey[4], O. Shirinda[3], A. Sithole[1,5], J. Sorri[4,†], S. Stolze[4,‡], J. Timár[9], J. Uusitalo[4], and G. Zimba[2]
Published 23 September 2019

Phys. Rev. C **100**, 034323
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034323
Observation of three-neutron sequential emission from ^{25}O*
C. Sword[1], J. Brett[1], T. Baumann[2], B. A. Brown[2,3], N. Frank[4], J. Herman[4], M. D. Jones[5], H. Karrick[4], A. N. Kuchera[6], M. Thoennessen[2,3,*], J. A. Tostevin[7], M. Tuttle-Timm[4], and P. A. DeYoung[1,†]
Published 26 September 2019

Phys. Rev. C **100**, 034606
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034606
Describing heavy-ion fusion with quantum coupled-channels wave-packet dynamics
Terence Vockerodt and Alexis Diaz-Torres
Published 6 September 2019

Phys. Rev. C **100**, 034903
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.034903
Dijet azimuthal correlations and conditional yields in pp and p+Pb collisions at $\sqrt{s_{NN}}$=5.02TeV with the ATLAS detector
M. Aaboud *et al.* (ATLAS Collaboration)
Published 6 September 2019

Phys. Rev. Lett. **123**, 112002
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.123.112002
First Observation of an Attractive Interaction between a Proton and a Cascade Baryon
ALICE Collaboration, UK Authors: H.A. Andrews, L.S. Barnby, M. Borri, M.D. Buckland, M. Chartier, G. Contin, 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, S. Ragoni, O. Villalobos Baillie, E.Willsher, N. Zardoshti
Published 13 September 2019

Phys. Lett. B, 797, 134805
https://www.sciencedirect.com/science/article/pii/S037026931930509X?via%3Dihub
Nuclear charge radii of $^{62-80}$Zn and their dependence on cross-shell proton excitations
L.Xie[a], X.F.Yang[bc], C.Wraith[d], C.Babcock[d], J.Bieroń[e], J.Billowes[a], M.L.Bissell[ca], K.Blaum[f], B.Cheal[d], L.Filippin[h], K.T.Flanagan[ai], R.F.Garcia Ruiz[ca], W.Gins[c], G.Gaigalas[g], M.Godefroid[h], C.Gorges[kl], L.K.Grob[jk], H.Heylen[cfj], P.Jönsson[m], S.Kaufmann[k], M.Kowalska[j], J.Krämer[k], S.Malbrunot-Ettenauer[j], R.Neugart[fl], G.Neyens[cj], W.Nörtershäuser[k], T.Otsuka[nocp], J.Papuga[c], R.Sánchez[q], Y.Tsunoda[n], D.T.Yordanov
Published 10 October 2019

Phys. Lett. B, **796**, 204-219
https://www.sciencedirect.com/science/article/pii/S0370269319304769
Measurement of jet radial profiles in Pb–Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV
ALICE Collaboration, UK Authors: H.A. Andrews, L.S. Barnby, M. Borri, M.D. Buckland, M. Chartier, G. Contin, 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, S. Ragoni, O. Villalobos Baillie, E.Willsher
Published 10 September 2019

Phys. Lett. B, **794**, 50-63
https://www.sciencedirect.com/science/article/pii/S0370269319303387
Multiplicity dependence of (anti-)deuteron production in pp collisions at √s = 7 TeV
ALICE Collaboration, UK Authors: H.A. Andrews, L.S. Barnby, M. Borri, M.D. Buckland, M. Chartier, G. Contin, 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, S. Ragoni, O. Villalobos Baillie, E.Willsher, N. Zardoshti
Published 10 July 2019

J. High. Energ. Phys. (2019):09:8
https://link.springer.com/article/10.1007/JHEP09%282019%29008
Production of muons from heavy-flavour hadron decays in pp collisions at $\sqrt{s_{NN}}$ = 5.02
ALICE Collaboration, UK Authors: H.A. Andrews, L.S. Barnby, M. Borri, M.D. Buckland, M. Chartier, G. Contin, 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, S. Ragoni, O. Villalobos Baillie, E.Willsher, N. Zardoshti
Published 2 September 2019

J. High. Energ. Phys. (2019):08:133
https://link.springer.com/article/10.1007/JHEP08%282019%29133
Measurement of the production of charm jets tagged with D0 mesons in pp collisions at √s = 7 TeV
ALICE Collaboration, UK Authors: H.A. Andrews, L.S. Barnby, M. Borri, M.D. Buckland, M. Chartier, G. Contin, 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, S. Ragoni, O. Villalobos Baillie, E.Willsher
Published 23 August 2019

Monthly Notices of the Royal Astronomical Society, Volume 489, Issue 1, October 2019, Pages 1379–1396
https://doi.org/10.1093/mnras/stz2104
Uncertainties in νp-process nucleosynthesis from Monte Carlo variation of reaction rates
N Nishimura (西村信哉), T Rauscher, R Hirschi, G Cescutti, A St J Murphy, C Fröhlich
Available online 2 August 2019

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2. News to Report

a. Launch of the STFC Cancer Diagnosis Network+

An event to launch the STFC Cancer Diagnosis Network+ (CDN+) was recently held at the University of Liverpool, organised by Dr Laura Harkness-Brennan of the Liverpool Nuclear Physics Group. Around 100 people from all over the UK attended, including members of the nuclear physics community. There were talks from cancer specialists and STFC scientists from institutions including the Institute of Cancer Research, the University of Cambridge, the French National Institute of Health and Medical Research, Delft University of Technology and STFC Rutherford Appleton Laboratory. Andy Boston of the Liverpool Nuclear Physics Group gave an overview of STFC capabilities in cancer diagnosis.

The Cancer Diagnosis Network+ is a multidisciplinary community with academic, clinical and industry members aiming to collaboratively address clinical challenges in the diagnosis of cancer. The CDN ultimately

seeks to enable researchers with expertise and knowledge developed through the STFC core science programmes and at STFC national facilities and laboratories to address challenges in early diagnosis, precision and quantitative imaging, multimodal techniques and data science techniques applied to imaging and bioinformatics. Early Career researchers can apply to undertake training opportunities, coordinated by Helen Boston. Funding calls for PhD studentships and travel awards are now open, more details can be found at http://stfccancerdiagnosis.org.

Members of the STFC CDN+ leadership team.

Contribution by Laura Harkness-Brennan (University of Liverpool)

b. Neutron physics in Neutrino astronomy workshop

The IoP Astroparticle physics group (APP) - Neutron scattering group (NS) joint workshop, "Neutron physics in Neutrino astronomy" will be held at King's College London, Nov. 8 (Thur.) 10:30 - 17:00.

https://sites.google.com/view/n-nu-workshop/home

Neutrinos are invisible particles and neutrino information is reconstructed from particles created by neutrino interactions. Neutrons are also created by these interactions, but are usually ignored in neutrino experiments. However, modern neutrino astronomy experiments such as SNO and Super-Kamiokande, as well as the future Hyper-Kamiokande and DUNE experiments, will utilize information of outgoing neutrons to improve neutrino measurements. Thus, a quantitative understanding of neutron properties from neutrino interactions is needed.

The IoP Astroparticle Physics and Neutron Scattering groups will hold a one-day joint event to discuss the latest problems of neutron detection and simulation in neutrino detectors, and potential neutron beam tests in the UK to improve them.

The workshop will take place on November 8 (10:30-17:00) at The Great Hall, King's College London. Although the event is free, registration is required due to space limitation. Limited travel funding will be available for students and early career researchers.

Organisers:

- Teppei Katori (Chair, King's College London)
- Elisabetta Canetta (St Mary's University)
- Lorenz Chris (King's College London)
- Simon Peters (University of Sussex)
- Arnau Rios (University of Surrey)

Contribution by Arnau Rios (University of Surrey)

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3. Outreach Activity

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4. Media Interactions

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