UK Nuclear Activity

July 2017 Issue 49

In this issue,

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

Nuclear Physics Public Engagement Website: www.stfc.ac.uk/NuclearPhysicsForYou

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1. Nuclear Physics Publications for July*

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.

J. Phys. G: Nucl. Part. Phys. 44 074003 (2014) http://iopscience.iop.org/article/10.1088/1361-6471/aa7297
New systematic features in the neutron-deficient Au isotopes
M Venhart1, J L Wood2, M Sedlák1, M Balogh1, M Bírová1, A J Boston3, T E Cocolios4,5, L J Harkness-Brennan3, R-D Herzberg3, L Holub1, D T Joss3, D S Judson3, J Kliman1, J Klimo1, L Krupa1,6, J Lušnák1,9, L Makhathini7, V Matoušek1, Š Motyčák6,8, R D Page3, A Patel3, K Petrík1, A V Podshibyakin6, P M Prajapati1, A M Rodin6, A Špaček1, R Urban1, C Unsworth3 and M Veselský1
*Published 8 June 2017

Eur. Phys. J. D 71:195 (2017) https://link.springer.com/article/10.1140%2Fepjd%2Fe2017-80122-x
Impact of buffer gas quenching on the $^1S_0 \rightarrow {}^1P_1$ ground-state atomic transition in nobelium
Premaditya Chhetri, Dieter Ackermann, Hartmut Backe, Michael Block, Bradley Cheal, Christoph Emanuel Düllmann, Julia Even, Rafael Ferrer, Francesca Giacoppo, Stefan Götz, Fritz Peter Heßberger, Oliver Kaleja, Jadambaa Khuyagbaatar, Peter Kunz, Mustapha Laatiaoui, Felix Lautenschläger, Werner Lauth, Enrique Minaya Ramirez, Andrew Kishor Mistry, Sebastian Raeder, Calvin Wraith, Thomas Walther, Alexander Yakushev
Published July 2017

Phys. Rev. C 96, 011301(R) (2017) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.96.011301
Triaxiality of neutron-rich ^{84,86,88}Ge from low-energy nuclear spectra
M. Lettmann[1,*], V. Werner[1], N. Pietralla[1], P. Doornenbal[2], A. Obertelli[2,3], T. R. Rodríguez[4], K. Sieja[5], G. Authelet[3], H. Baba[2], D. Calvet[3], F. Château[3], S. Chen[2,6], A. Corsi[3], A. Delbart[3], J.-M. Gheller[3], A. Giganon[3], A. Gillibert[3], V. Lapoux[3], T. Motobayashi[2], M. Niikura[7], N. Paul[2,3], J.-Y. Roussé[3], H. Sakurai[2,7], C. Santamaria[3], D. Steppenbeck[2], R. Taniuchi[2,7],

*Also including missed publications from previous months.

T. Uesaka[2], T. Ando[2,7], T. Arici[8], A. Blazhev[9], F. Browne[10], A. Bruce[10], R. J. Caroll[11], L. X. Chung[12], M. L. Cortés[1,2,8], M. Dewald[9], B. Ding[13], F. Flavigny[14], S. Franchoo[14], M. Górska[8], A. Gottardo[14], A. Jungclaus[15], J. Lee[16], B. D. Linh[12], J. Liu[16], Z. Liu[13], C. Lizarazo[1,8], S. Momiyama[2,7], K. Moschner[9], S. Nagamine[7], N. Nakatsuka[17], C. Nita[18], C. R. Nobs[10], L. Olivier[14], Z. Patel[11], Zs. Podolyák[11], M. Rudigier[11], T. Saito[7], C. Shand[11], P.-A. Söderström[1,2,8], I. Stefan[14], V. Vaquero[15], K. Wimmer[7], and Z. Xu[16,19]
Published 5 July 2017

Phys. Lett. B 770, 83 (2017) http://www.sciencedirect.com/science/article/pii/S0370269317303088
Spectroscopic factor and proton formation probability for the $d_{3/2}$ proton emitter ^{151m}Lu
F. Wang a, B.H. Sun a,∗, Z. Liu b,c,∗∗, R.D. Page d, C. Qi e, C. Scholey f , S.F. Ashley c, L. Bianco d, I.J. Cullen c, I.G. Darby g, S. Eeckhaudtf , A.B. Garnsworthy h, W. Gelletly c, M.B. Gomez-Hornillos i , T. Grahn f , P.T. Greenlees f , D.G. Jenkins j , G.A. Jones c, P. Jones k, D.T. Joss d, R. Julin f , S. Juutinen f , S. Ketelhutf , S. Khan l , A. Kishada l , M. Leino f , M. Niikura m, M. Nyman n, J. Pakarinen d, S. Pietri o, Z. Podolyak c, P. Rahkila f , S. Rigby d, J. Saren f , T. Shizuma p, J. Sorri f , S. Steer c, J. Thomson d, N.J. Thompson c, J. Uusitalo f , P.M. Walker c, S. Williams q, H.F. Zhang r , W.Q. Zhang b, L.H. Zhu a
Published 10 July 2017

Phys. Lett. B 770, 459 (2017) http://www.sciencedirect.com/science/article/pii/S037026931730237X
Production of muons from heavy-flavour decays in p–Pb collisions at $\sqrt{s_{NN}}$ = 5.02 TeV
ALICE Collaboration, UK Authors: D. Alexandre, H. A. Andrews, L. S. Barnby, M. Borri, M. Chartier, D. Evans, K. L. Graham, P. G. Jones, A. Jusko, M. Krivda, R. C. Lemmon, R. Lietava, J. Norman, O. Villalobos Baillie, N. Zardoshti
Published 10 July 2017

Phys. Rev. C 96, 014003 (2017) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.96.014003
Comparison of nuclear Hamiltonians using spectral function sum rules
A. Rios[1], A. Carbone[2,3], and A. Polls[4]
Published 24 July 2017

Phys. Rev. C 96, 014319 (2017) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.96.014319
Experimental study of ^{100}Tc β decay with total absorption γ-ray spectroscopy
V. Guadilla[1,*], A. Algora[1,2,†], J. L. Tain[1], J. Agramunt[1], D. Jordan[1], A. Montaner-Pizá[1], S. E. A. Orrigo[1], B. Rubio[1], E. Valencia[1], J. Suhonen[3], O. Civitarese[4], J. Äystö[3], J. A. Briz[5], A. Cucoanes[5], T. Eronen[3], M. Estienne[5], M. Fallot[5], L. M. Fraile[6], E. Ganioğlu[7], W. Gelletly[1,8], D. Gorelov[3], J. Hakala[3], A. Jokinen[3], A. Kankainen[3], V. Kolhinen[3], J. Koponen[3], M. Lebois[9], T. Martinez[10], M. Monserrate[1], I. Moore[3], E. Nácher[11], H. Penttilä[3], I. Pohjalainen[3], A. Porta[5], J. Reinikainen[3], M. Reponen[3], S. Rinta-Antila[3], K. Rytkönen[3], T. Shiba[5], V. Sonnenschein[3], A. A. Sonzogni[12], V. Vedia[6], A. Voss[3], J. N. Wilson[9], and A.-A. Zakari-Issoufou[5]
Published 27 July 2017

Phys. Rev. C 96, 014320 (2017) https://journals.aps.org/prc/abstract/10.1103/PhysRevC.96.014320
Total absorption spectroscopy study of the β decay of ^{86}Br and ^{91}Rb
S. Rice[1], A. Algora[2,3,*], J. L. Tain[2], E. Valencia[2], J. Agramunt[2], B. Rubio[2], W. Gelletly[1,2], P. H. Regan[1,4], A.-A. Zakari-Issoufou[5], M. Fallot[5], A. Porta[5], J. Rissanen[6], T. Eronen[6], J. Äystö[7], L. Batist[8], M. Bowry[1], V. M. Bui[5], R. Caballero-Folch[9], D. Cano-Ott[10], V.-V. Elomaa[6], E. Estevez[2], G. F. Farrelly[1], A. R. Garcia[10], B. Gomez-Hornillos[9], V. Gorlychev[9], J. Hakala[6], M. D. Jordan[2], A. Jokinen[6], V. S. Kolhinen[6], F. G. Kondev[11], T. Martínez[10], P. Mason[1], E. Mendoza[10], I. Moore[6], H. Penttilä[6], Zs. Podolyák[1], M. Reponen[6], V. Sonnenschein[6], A. A. Sonzogni[12], and P. Sarriguren[13]
Published 27 July 2017

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2. News to Report

a. Jacek Dobaczewski awarded honorary degree

Congratulations to Prof Jacek Dobaczewski who has been honoured by the Claude Bernard Lyon 1 University.
The University decided to confer on Prof Dobaczewski an honorary degree of Doctor honoris causa, this award makes him a distinguished member of the universities academic community. The official award ceremony will take place on 20 November 2017.
The Claude Bernard Lyon 1 University is a leading academic institution in France, ranked 2nd in France and 77th worldwide in the recent Reuters Top 100: The World's Most Innovative Universities - 2016 ranking. Since the early nineties, Prof Dobaczewski has been collaborating with the world-class nuclear theory group at Lyon, which in the recent years has culminated in a series of papers written together with Dr Karim Bennaceur.

Prof. Dobaczewski came to the University of York in 2015 on an STFC grant with a mission to establish a new nuclear theory activity that would work towards constructing novel nuclear energy density functionals. The Nuclear Physics Group at York works within a web of intense international collaboration of which the group at Lyon is one of the principal pillars.
Contribution from York Physics Department News & events

b. Andrei Andreyev awarded CERN Scientific Associateship

In order to fulfil its role as a European centre and as a member of the world-wide community of scientific institutes, CERN offers Scientific Associateships to established scientists so they can use CERN's facilities to participate in its research programmes.
This Scientific Associateship will enable Andrei Andreyev (York) to work at ISOLDE, and be involved in a broad range of activities, including Coulex experiments with HIE-ISOLDE, decay studies at ISOLDE Decay Station (IDS, http://isolde.web.cern.ch/experiments/isolde-decay-station-ids), laser-assisted experiments at Windwill and CRIS facilities, and several other projects .
Contribution by Andrei Andreyev andrei.andreyev@york.ac.uk *(York)*

c. First African-led experiment at CERN

Article from: UK News from CERN
The first African-led experiment has taken place at CERN, supported by UK researchers. Students and staff from the University of the Western Cape (UWC) have investigated the isotope Selenium 70. The nucleus is known to have two possible shapes depending on its excitation state, and the team wanted to examine the relationship between shape and energy more closely.
South Africa joined the Isolde collaboration in March 2017 to benefit from HIE-Isolde's beams of unstable, exotic particles – the country's own nuclear physics facility has a source of stable beams. The selenium 70 experiment, using Miniball, is the first to be approved.
"We're going to be accelerating a selenium beam into a platinum target," explains PhD student Kenzo Abrahams, as the rest of the team configures the experiment. "By colliding two nuclei, we will cause the excitation of the selenium 70 isotope, and by measuring the intensity of the gamma ray decay, we'll know which shape has been excited."
The UWC team, comprising masters and PhD students from the coulomb excitation group, led by Professor Nico Orce and supported by experiment co-lead, Professor David Jenkins from the University of York, certainly feel that they are blazing the way for other South African universities to submit proposals. "The University of the Western Cape is a historically disadvantaged institution," explains Nico, "we have team members from rural areas of the Eastern Cape, and others who live in townships. I hope this experiment will have a domino effect, encouraging similar students and universities to aim for the top."
And that's already happening; Sifiso Ntshangase from the University of Zululand is part of the experiment, and the opportunity to be involved has contributed to him becoming a Team Leader for his institution.
Totalling 11 people, the experimental team is much larger than Isolde would normally welcome, but Nico was determined to give as many of his students as possible the opportunity to use one of the world's best research facilities.
Senamile Masango is a masters student, "this is my first time outside South Africa and it's very exciting to be at CERN," she says, "it's every scientist's dream to come to facilities like this!"
Passionate about her subject, and highly motivated, Senamile is also well aware that she is an important role model, "you will hardly find any women doing physics in South Africa, and you will hardly find any black physicists. Nico treats us all equally and he's making us hungry to break every barrier. We're making history!"
"The skills that the students are learning at CERN are transformational," says George O'Neill. Having finished his PhD at Liverpool, George wanted the challenge of working in a new lab; he was attracted by both the facilities at UWC and Nico's ethos, "Everyone in this group will go on to be a professor," he adds.
David Jenkins is co-leading the experiment. "I've worked with Nico for a long time and I've been teaching at his 'Tastes of Nuclear Physics' summer school for five years. UWC has a real battle to get funding and Nico has jumped through so many hoops to get here. I wanted to get them involved at Isolde and

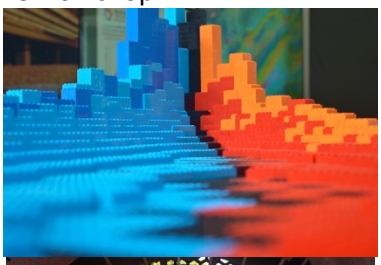
help build the research expertise in the team."
If the extraordinary levels of energy and motivation demonstrated by the team are mirrored by the experimental results, then UWC is set to become a significant name in international nuclear physics.
Contribution by Steph Hills stephanie.hills@stfc.ac.uk *(STFC/CERN) sent in by David Jenkins* david.jenkins@york.ac.uk *(York)*

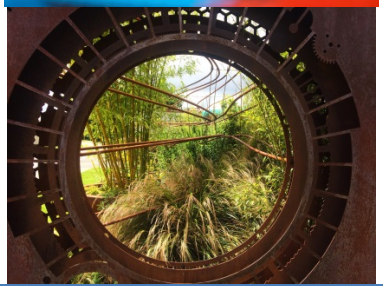
d. Nuclear Physics Masterclasses – 2017 the most successful year so far!
Over the past month and a half 318 secondary school students have attended Nuclear physics masterclasses at the University of York (22/06/2017), University of Surrey (27/06/2017) and at Daresbury Laboratory (13 & 14/07/2017). The success of these events is down to the enthusiastic support from the host nuclear physics groups, as well as workshops and lectures kindly contributed by the Universities of Manchester and Liverpool. A big thank you to everyone who contributed to making this year's masterclasses the most successful yet!

York Masterclass
The programme for this first time event was an impressive combination of lectures and hands on workshops coordinated by the York outreach officer Katherine Leech. The two talks were given by Marina Petri (introduction to nuclear physics) and Chris Murphy (cutting edge nuclear physics). The parallel workshops included: Liverpool's detector activity by Paul Nolan and team, Hot CNO cycle by Mike Bentley, Neutron stars by Alessandro Pastore, the Lego Binding blocks workshops by Christian Diget and Charles Barton, and a fusion workshop at the York Plasma Institute. Each workshop was also enthusiastically supported by numerous undergraduate and postgraduate students.

Surrey Masterclass
The fourth Surrey nuclear physics masterclass was the biggest yet! The day consisted of two lectures – an introduction to nuclear physics by Paddy Regan and a talk about neutron stars by Arnau Rios. The students also had an opportunity to use Surrey's undergraduate radiation teaching laboratory to investigate neutron activated copper samples and learn more about the astrophysical s-process.
Thanks to the University of York very kindly sending their LEGO Binding blocks chart along with two UG students to run their schools workshop at the event we were able to double the capacity and run parallel workshops.
The day was organised by the Surrey outreach officer Heather Campbell and supported by Surrey's finest PhD students and post docs.
The day finished with a 'making ice cream from liquid nitrogen' activity, which was enjoyed by all.

Daresbury Masterclass
This masterclass was a celebration of the fun that comes from working in Nuclear Physics, and included lectures and interactive workshops.
Students got to grips with radiation detection with activities and materials provided by Paul Nolan and team from the University of Liverpool; simulated radiation interaction with matter using computers run by Marc Labiche, and worked to build 3D nuclear chart of all isotopes made completely out of Lego with staff from the University of York.
Laura Harkness Brennan (Liverpool) and John Simpson (Head of STFC Nuclear Physics) set the scene for the day with an introduction to nuclear physics and Daresbury Laboratory whilst John Roberts (Manchester) rounded the day off with an engaging discussion about nuclear energy that separated the facts from the fuss!
Students were invited to partake in a photo competition for the day and took some fantastic photographs of both the site and the work they were doing. The winning photos (below), taken by Nate Townsend and Eleanor Marnell, were posted on twitter @STFC_matters along with other tweets about the workshop.





The event was the result of a large amount of work and collaboration between the Daresbury Nuclear Physics group, the University of Liverpool, University of York, University of Manchester and the Public Engagement teams at Swindon and Daresbury. Thank you to everyone involved.
Taken from STFC in.brief article by Gemma Reed gemma.reed@stfc.ac.uk (Daresbury)

This year's nuclear physics masterclasses have engaged a record number of students with the amazing research that goes on in our community. If any other groups would like to host an event next year please get in touch.
Contribution by Elizabeth Cunningham elizabeth.cunningham@stfc.ac.uk (STFC/Surrey)

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3. Outreach Activity

Big Bang Fair South East
This event took place at the South of England Showground on 28th June. The event saw more than 8,000 9-19 year olds and their teachers enjoying a day packed with exciting shows, interactive displays and hands-on workshops all focused on science and engineering.
Throughout the day representatives from the Institute of Physics South Central Branch (SCB) Committee, and volunteer Rosanella Di Costanzo, provided a variety of physics busking activities. These activities included straw oboes, amazing marshmallows, erupting fizz and balloon kebabs, all organised by the Regional Officer for London and the South East, Dr Olivia Keenan. Details of these experiments and many other physics busking activities can be found on the "Physics to go" page. SCB Committee member Ian Galloway also posed an array of physics puzzles to challenge the students to find explanations. All of the demonstrations proved very popular, particularly the straw oboes, and the IoP stall was packed throughout the event. Many interesting questions were generated from students as they interacted with the stall. Wearing an "Ask me what I do" badge, SCB Committee member Chantal Nobs spent much of the day discussing her research as a physicist at the Culham Centre for Fusion Energy with students and teachers.
Contribution by Chantal Nobs chantal.nobs@ukaea.uk (Culham Centre for Fusion Energy)

Nuclear Power: the Good, the Bad & the Ugly
Dr Bjoern Seitz from nuclear physics at the University of Glasgow delivered a talk on the pros, cons and risks of nuclear power to a packed audience of "Glasgow Skeptics" in the city's Admiral Bar. Having split his research time between understanding the fundamental strong interaction and the development of radiation sensors for applications on medicine and nuclear decommissioning, his expertise led to a field trip assessing radioactive contamination around Fukushima city and enabling the local universities in operating radiation sensors and ultimately to presenting on these issues to a general audience.
The presentation to a capacity crowd introduced the concept of nuclear power and its associated risks, before highlighting the presenters personal work in Japan's Fukushima province after the nuclear accident in 2011 and leading on to the promises and threats associated with electricity generation by nuclear energy and a very lively long discussion at the bar afterwards.
Contribution by Bjorn Seitz Bjoern.Seitz@glasgow.ac.uk (Glasgow)

Nuclear Physics Headstart Summer School
The Nuclear Physics Group from the School of Physics and Astronomy at The University of Manchester hosted another Nuclear Physics Headstart Summer School for 40 (17 girls) sixth form pupils in July. The four days of activities included undergraduate level lectures, experimental and simulation labs plus a full day visit to Daresbury Laboratory. The visit to Daresbury included lectures, a tour of EMMA and the Medical Research and Teaching Laboratory plus a trip to the top of the former Nuclear Structure Facility. We are very grateful to Wendy Cotterill and all the staff at the lab for organising such a great day and making the pupils feel so welcome.

Contribution by John Roberts j.w.roberts@manchester.ac.uk (Manchester)

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4. Media Interactions

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