# UK Nuclear Activity

February 2014 Issue 8

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♥ Love is in the air… or is it dark matter? http://www.stfc.ac.uk/3027.aspx ♥

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

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***1. Nuclear Physics Publications for February****

If you are publishing a paper that you think would be of media value please let Wendy Ellison wendy.ellison@stfc.ac.uk , STFC Press Officer, know. 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 89, 014313 http://journals.aps.org/prc/abstract/10.1103/PhysRevC.89.014313
Coulomb excitation of neutron-rich Cd isotopes
S. Ilieva[1,*], M. Thürauf[1], Th. Kröll[1,2], R. Krücken[2], T. Behrens[2], V. Bildstein[2,3], A. Blazhev[4], S. Bönig[1], P. A. Butler[5], J. Cederkäll[6], T. Davinson[7], P. Delahaye[6], J. Diriken[8,9], A. Ekström[10], F. Finke[4], L. M. Fraile[11], S. Franchoo[12], Ch. Fransen[4], G. Georgiev[13], R. Gernhäuser[2], D. Habs[14], H. Hess[4], A. M. Hurst[5,15], M. Huyse[8], O. Ivanov[8], J. Iwanicki[16], P. Kent[17], O. Kester[14], U. Köster[6], R. Lutter[14], M. Mahgoub[2], D. Martin[4], P. Mayet[8], P. Maierbeck[2], T. Morgan[14], O. Niedermeier[3], M. Pantea[1], P. Reiter[4], T. R. Rodríguez[1], Th. Rolke[4], H. Scheit[3], A. Scherillo[4,18], D. Schwalm[3], M. Seidlitz[4], T. Sieber[6], G. S. Simpson[18], I. Stefanescu[8], S. Thiel[4], P. G. Thirolf[1], J. Van de Walle[8], P. Van Duppen[8], D. Voulot[6], N. Warr[4], W. Weinzierl[2], D. Weisshaar[4], F. Wenander[6], A. Wiens[4], and S. Winkler[2]
*Published 21 January 2014

Phys. Rev. C 89, 014324 http://journals.aps.org/prc/abstract/10.1103/PhysRevC.89.014324
β-decay studies of neutron-rich Tl, Pb, and Bi isotopes
A. I. Morales[1,2,*], G. Benzoni[1], A. Gottardo[3,4], J. J. Valiente-Dobón[3], N. Blasi[1], A. Bracco[1,2], F. Camera[1,2], F. C. L. Crespi[1,2], A. Corsi[1,2], S. Leoni[1,2], B. Million[1], R. Nicolini[1,2], O. Wieland[1], A. Gadea[5], S. Lunardi[4,6], M. Górska[7], P. H. Regan[8,9], Zs. Podolyák[8], M. Pfützner[10], S. Pietri[7], P. Boutachkov[7], H. Weick[7], J. Grebosz[11], A. M. Bruce[12], J. Alcántara Núñez[13], A. Algora[5,14], N. Al-Dahan[8], Y. Ayyad[13], N. Alkhomashi[8,15], P. R. P. Allegro[16], D. Bazzacco[6], J. Benlliure[13], M. Bowry[8], M. Bunce[8], E. Casarejos[17], M. L. Cortes[7], A. M. Denis Bacelar[12], A. Y. Deo[8,†], G. de Angelis[3], C. Domingo-Pardo[7], M. Doncel[18], Zs. Dombradi[19], T. Engert[7], K. Eppinger[20], G. F. Farrelly[8], F. Farinon[7], E. Farnea[6], H. Geissel[7], J. Gerl[7], N. Goel[7], E. Gregor[7], T. Habermann[7], R. Hoischen[7,21], R. Janik[22], S. Klupp[23], I. Kojouharov[7], N. Kurz[7], S. Mandal[24], R. Menegazzo[6], D. Mengoni[6], D. R. Napoli[3], F. Naqvi[7,25], C. Nociforo[7], A. Prochazka[7], W. Prokopowicz[7], F. Recchia[6], R. V. Ribas[16], M. W. Reed[8], D. Rudolph[21], E. Sahin[3], H. Schaffner[7], A. Sharma[7], B. Sitar[22], D. Siwal[24], K. Steiger[20], P. Strmen[22], T. P. D. Swan[8], I. Szarka[22], C. A. Ur[6], P. M. Walker[8], and H.-J. Wollersheim[7]
*Published 29 January 2014

*Also including missed publications from January.


Edited by Elizabeth Cunningham, STFC Particle and Nuclear Physics Outreach Officer.
Elizabeth.Cunningham@stfc.ac.uk or E.Cunningham@surrey.ac.uk

Phys. Rev. C 89, 024602 http://journals.aps.org/prc/abstract/10.1103/PhysRevC.89.024602
Two-neutron transfer reaction mechanisms in 12C(6He,4He)14C using a realistic three-body 6He model
D. Smalley[1,*], F. Sarazin[1], F. M. Nunes[2,3], B. A. Brown[2,3], P. Adsley[4], H. Al-Falou[5], C. Andreoiu[6], B. Baartman[6], G. C. Ball[5], J. C. Blackmon[7], H. C. Boston[8], W. N. Catford[9], S. Chagnon-Lessard[10], A. Chester[6], R. M. Churchman[5], D. S. Cross[6], C. Aa. Diget[4], D. Di Valentino[11], S. P. Fox[4], B. R. Fulton[4], A. Garnsworthy[5], G. Hackman[5], U. Hager[1], R. Kshetri[6], J. N. Orce[5], N. A. Orr[12], E. Paul[8], M. Pearson[5], E. T. Rand[10], J. Rees[8], S. Sjue[5], C. E. Svensson[10], E. Tardiff[5], A. Diaz Varela[10], S. J. Williams[2], and S. Yates[13]
Published 6 February 2014

Phys. Rev. C 89, 024307 (2014) http://journals.aps.org/prc/abstract/10.1103/PhysRevC.89.024307
Shape coexistence in neutron-deficient Hg isotopes studied via lifetime measurements in Hg184,186 and two-state mixing calculations
L. P. Gaffney[1,2,*], M. Hackstein[3,†], R. D. Page[1,‡], T. Grahn[1,4], M. Scheck[1,5], P. A. Butler[1], P. F. Bertone[6], N. Bree[2], R. J. Carroll[1], M. P. Carpenter[6], C. J. Chiara[6,7], A. Dewald[3], F. Filmer[1], C. Fransen[3], M. Huyse[2], R. V. F. Janssens[6], D. T. Joss[1], R. Julin[4], F. G. Kondev[8], P. Nieminen[4], J. Pakarinen[1,4,9], S. V. Rigby[1], W. Rother[3], P. Van Duppen[2], H. V. Watkins[1], K. Wrzosek-Lipska[2], and S. Zhu[6]
Published 11 February 2014

Phys. Rev. C 89, 024605 http://journals.aps.org/prc/abstract/10.1103/PhysRevC.89.024605
Adiabatic model of (d,p) reactions with explicitly energy-dependent nonlocal potentials
R. C. Johnson and N. K. Timofeyuk
Published 13 February 2014

Phys. Rev. C 89, 024309 http://journals.aps.org/prc/abstract/10.1103/PhysRevC.89.024309
Coulomb excitation of 29,30Na: Mapping the borders of the island of inversion
M. Seidlitz[1], P. Reiter[1], R. Altenkirch[1], B. Bastin[2], C. Bauer[3], A. Blazhev[1], N. Bree[2], B. Bruyneel[1], P. A. Butler[4], J. Cederkäll[5], T. Davinson[6], H. De Witte[2], D. D. DiJulio[7], J. Diriken[2], L. P. Gaffney[4], K. Geibel[1], G. Georgiev[8], R. Gernhäuser[9], M. Huyse[2], N. Kesteloot[2], T. Kröll[3,9], R. Krücken[9,10], R. Lutter[11], J. Pakarinen[12], F. Radeck[1], M. Scheck[13,14], D. Schneiders[1], B. Siebeck[1], C. Sotty[15], T. Steinbach[1], J. Taprogge[1,16], P. Van Duppen[2], J. Van de Walle[15,17], D. Voulot[15], N. Warr[1], F. Wenander[15], K. Wimmer[9,18], P. J. Woods[6], and K. Wrzosek-Lipska[2,19]
Published 19 February 2014

Phys. Rev. C 89, 024316 http://journals.aps.org/prc/abstract/10.1103/PhysRevC.89.024316
Quasiparticle alignments and α-decay fine structure of 175Pt
P. Peura[1,*], C. Scholey[1], D. T. Joss[2], S. Juutinen[1], R. Julin[1], T. Bäck[3], B. Cederwall[3], P. T. Greenlees[1], U. Jakobsson[1], P. Jones[1,†], D. S. Judson[2,‡], S. Ketelhut[1,§], M. Labiche[4], M. Leino[1], M. Nyman[1], D. O'Donnell[4], R. D. Page[2], P. Rahkila[1], P. Ruotsalainen[1], M. Sandzelius[1], P. J. Sapple[2], J. Sarén[1], J. Simpson[4], J. Thomson[2], J. Uusitalo[1], and H. V. Watkins[2,‖]
Published 24 February 2014

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***2. News to report***

**a. The UK shines again at the INTC:**
The ISOLDE-n-ToF Committee meeting was held at CERN on 12 Feb. This scientific committee evaluates the proposed experimental programmes at the two nuclear facilities at CERN (namely ISOLDE and nToF). The nToF highlights were the first proposal to move and setup the Manchester-built STEFF fission fragment spectrometer to the new experimental area 2 (EAR2), under the leadership of Dr Gavin Smith (Manchester), and a new astrophysical proposal on the destruction of 26Al by neutron-induced reactions, under the leadership of Prof Phil Woods (Edinburgh). For the ISOLDE part, the meeting was dedicated to the review of the low-energy programme of that facility. The CRIS and Windmill collaborations were represented by Dr Kieran Flanagan (Manchester) and Prof Andrei Andreyev (York) respectively. We all await the official feedbacks from the closed session of the meeting with bated breath, though some of us may already have heard some good news from Dr Wilton Catford (Surrey) who sits on the INTC.
*Contribution by Thomas Elias Cocolios thomas.elias.cocolios@cern.ch (Manchester)*

**b. Stored ions at HIE-ISOLDE: the TSR workshop.** A workshop was held at CERN on Valentine's day to discuss the move of the

Test Storage Ring (TSR) from Heidelberg (Germany) to HIE-ISOLDE at CERN. The radioactive ions from ISOLDE will be stored and recirculated (~1MHz) to increase the luminosity of nuclear reactions of astrophysical interest or to perform spectroscopy on highly charged ions. An electron cooler also provides beams of unprecedented quality for transfer reactions and Coulomb excitation with an external spectrometer. More information on the Storage Ring at HIE-ISOLDE can be found in a dedicated publication [1].

This international venture has a very strong UK leadership, including Prof Peter Butler (Liverpool) as Physics Coordinator and Prof Phil Woods (Edinburgh) as Deputy Spokesperson, as well as Prof Phil Walker (Surrey) and Dr Kieran Flanagan and Dr Thomas Cocolios (Manchester) as conveners for the isomeric beam and the laser spectroscopy experiments, respectively. The meeting reported very positively on the integration studies that have been performed at CERN and in Heidelberg, and a wide range of experimental possibilities were presented by Prof Peter Butler, Prof Phil Woods and Prof Sean Freeman (Manchester). Several working groups were established, with Prof Phil Woods, Prof Sean Freeman, Prof Phil Walker and Dr Kieran Flanagan leading in their respective fields of interest. Those working groups are expected to gather the interest of the international community, to identify flagship experiments, and to report at the STORI conference in the autumn of 2014. More information about the workshop, including the slides and the established working groups, may be found at https://indico.cern.ch/event/271980/.

[1] M. Grieser et al., European Physical Journal Special Topics 207 (2012) 1-117.

*Contribution by Thomas Elias Cocolios thomas.elias.cocolios@cern.ch (Manchester)*

**c. Nucleosynthesis - Origins and Impacts.**

A Royal Astronomical Society Specialist Discussion. Valentine's Day, 2014.

Present day isotopic abundances are the direct result of - and indeed evidence for - the nuclear physics processes occurring in the Universe. A deep understanding of nucleosynthesis requires input from scientists working in a broad range of disciplines. Bringing these communities together was the principle aim of this Specialist Discussion, updating one another on recent advances, and hopefully enabling and motivating further progress. Speakers included Brad Gibson (UC Lancs), Alex Murphy (Edinburgh), Christian Diget (York), Marco Pignatari (Basel), Stephen Smartt (QUB), Monica Grady (OU), Hilary Downes (Birkbeck), Katrin Lind (Cambridge) and Vincent Margerin (Edinburgh). The topics covered were galactic chemical evolution, recent advances in nuclear astrophysics techniques, key nuclear physics uncertainties, stellar modelling, core collapse supernovae, pre-solar meteorites, and isotope variations both in the solar neighbourhood and in stars. The meeting attracted around 40 participants and was organised on behalf of the Royal Astronomical Society by Alex Murphy (Edinburgh) and Sean Ryan (Herts).

This meeting follows similar recent meetings organised under the auspices of the Institute of Physics. In a related action, a new collaboration platform has been formed, BRIDGCE. This is a UK-wide network established to BRIdge the Disciplines related to Galactic Chemical Evolution. The goal of this network is to facilitate collaborations across the different disciplines involved in the study of the origin of the elements. For more details, see http://www.astro.keele.ac.uk/bridgce.

*Contribution by Alex Murphy a.s.murphy@ed.ac.uk (Edinburgh)*

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***3. Outreach Activity***

**PHYSICS FUNdamentals** was created to make physics, and more general science, accessible to the general public, especially to children. The website makes science news more digestible, and it makes it easier to find places on the web and in the UK to interact with science. On the 19th and 20th February PHYSICS FUNdamentals exhibited a variety of hands-on experiments at the Kent Festival of Science, in Canterbury. The festival is held on a yearly basis with hundreds of local school children, and their parents, attending each day. The interactive experiments included demonstrating refraction and total internal reflection using circular jelly and laser pens and showing the density of different liquids with a density tower. Also on display was

MaKey MaKey, a circuit board that allowed varies types of fruits, vegetables, metals and other conductors of electricity to be used at a keyboard to play games and musical instruments online.

The event was greatly successful in attracting children of a range of ages and abilities, all of whom appeared to engage with all of our experiments.
To find out more about PHYSICS FUNdamentals visit our website: www.physicsfundamentals.org.
*Contribution by Chantal Nobs c.nobs@brighton.ac.uk (Brighton)*

**Public Talk.** On 30th January, Elizabeth Cunningham gave the first in a series of STEM lectures at Sydenham School. The talk on nuclear astrophysics was entitled 'Life, the Universe and Everything'. It was attended by +100 students and parents.

*Contribution by Elizabeth Cunningham e.cunningham@surrey.ac.uk (Surrey)*

**STFC Public Engagement Fellowships Call for Applications now open.** Do you love sharing your research with the general public? Have you found a really cool way to communicate your science? Do you ever wish you had more time in your busy schedule to do public engagement? STFC are pleased to announce that the 2014 Public Engagement Fellowship round is now open.

The scheme is open to all STFC funded researchers who are good communicators with research credibility to act as champions for STFC science and technology. The Fellowships purchase a proportion of a researcher's time to enable you to concentrate more on public engagement activities. **The closing date for applications is Friday the 7th March at 4pm.**

**British Science Association Media Fellowships.** Do you want to put science in the headlines? If you do then the British Science Association Media Fellowships are for you. The British Science Association Media Fellowships provide a unique opportunity for practising scientists, clinicians and engineers to spend three to six weeks working at the heart of a media outlet such as the Guardian, the BBC or Nature News. Last year STFC supported two Fellows, Natalie Starkey and Simon Redfern , you can read about their experiences here: http://www.stfc.ac.uk/3023.aspx
Discover first-hand how science is reported by spending 3-6 weeks on a summer placement with a press, broadcast or online journalist such as the Guardian, The Times or BBC.
You will work with them to produce well informed, newsworthy pieces about developments in science. Come away better equipped to communicate your research to the media, public and your colleagues. You will develop communication skills that could help you produce concise and engaging articles and funding applications. For details about the scheme, including eligibility and online application form, visit the British Science Association webpage.
**Application deadline: 16 March 2014**
For further details or information please contact: Neville Hollingworth (STFC) neville.hollingworth@stfc.ac.uk or Mónica Lobo (BSA) monica.lobo@britishscienceassociation.org

**The Public Engagement Small Awards Scheme**. STFC has announced that the 2014A Small Awards scheme round is open. **The closing date is 10th April 2014 at 16:00 hrs.**
The Public Engagement Small Awards Scheme provides funds for small, local or 'pilot' projects promoting STFC science and technology. Almost anyone can apply, including grant-funded research groups, STFC research facility users, schools, museums, etc.

Awards range from £500 to £10,000 and the expenditure can go towards materials, salaries and travel & subsistence.
Projects must be relevant to publicising engagement or teaching about the STFC science and technology areas, namely:

- particle physics;
- nuclear physics;
- space, ionospheric, solar and planetary science;
- astronomy;
- astrophysics;
- cosmology
- studying materials with muon and neutron sources
- studying materials with synchrotron light sources
- research using laser facilities
- other science areas

Applicants should also consult the STFC Public Engagement Strategy in advance of submitting your proposal and are also encouraged (if applicable) to consider working with under-represented audiences such as girls and young women in engineering and physics, groups in areas geographically remote from STEM activity and underperforming schools.

Please see the notes for guidance for further information. All applications must be submitted through the RCUK Joint electronic submission (Je-S) system. E-mailed or hard copy applications will not be accepted.
The STFC contact is: Andy Thompson Andy.Thompson@stfc.ac.uk, Tel: 01793 442098.

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***4. Media Interactions***

**Sellafield partly closed after 'above normal' radiation**
http://www.bbc.co.uk/news/uk-england-cumbria-25975785

*Contribution by Paddy Regan p.regan@surrey.ac.uk (Surrey)*

**Higgs would not find his boson in today's 'publish or perish' research culture**
http://www.theguardian.com/commentisfree/2014/feb/14/higgs-boson-publish-or-perish-science-culture

*Contribution by Jim Al-Khalili j.al-khalili@surrey.ac.uk (Surrey)*