UK Nuclear Activity

August 2019 Issue 74

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

Nuclear Physics Public Engagement Website: NuclearPhysicsForYou

Nuclear Physics Outreach Poster – order hardcopies from STFC free of charge here

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1. Nuclear Physics Publications for August (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.

Eur. Phys. J. A (2019) 55: 147
https://link.springer.com/article/10.1140%2Fepja%2Fi2019-12830-3
The angular momentum dependence of nuclear optical potentials
R.S. Mackintosh
Available online 2 September 2019

Eur. Phys. J. A (2019) 55: 130
https://link.springer.com/article/10.1140/epja/i2019-12815-2
Electromagnetic properties of low-lying states in neutron-deficient Hg isotopes: Coulomb excitation of ^{182}Hg, ^{184}Hg, ^{186}Hg and ^{188}Hg
K. Wrzosek-Lipska, K. Rezynkina, N. Bree, M. Zielińska, L. P. Gaffney, A. Petts, A. Andreyev, B. Bastin, M. Bender, A. Blazhev, B. Bruyneel, P. A. Butler, M. P. Carpenter, J. Cederkäll, E. Clément, T. E. Cocolios, A. N. Deacon, J. Diriken, A. Ekström, C. Fitzpatrick, L. M. Fraile, Ch. Fransen, S. J. Freeman, J. E. García-Ramos, K. Geibel, R. Gernhäuser, T. Grahn, M. Guttormsen, B. Hadinia, K. Hadyńska-Klęk, M. Hass, P. -H. Heenen, R. -D. Herzberg, H. Hess, K. Heyde, M. Huyse, O. Ivanov, D. G. Jenkins, R. Julin, N. Kesteloot, Th. Kröll, R. Krücken, A. C. Larsen, R. Lutter, P. Marley, P. J. Napiorkowski, R. Orlandi, R. D. Page, J. Pakarinen, N. Patronis, P. J. Peura, E. Piselli, L. Próchniak, P. Rahkila, E. Rapisarda, P. Reiter, A. P. Robinson, M. Scheck, S. Siem, K. Singh Chakkal, J. F. Smith, J. SrebrnyI. Stefanescu, G. M. Tveten, P. Van Duppen, J. Van de Walle, D. Voulot, N. Warr, A. Wiens, J. L. Wood
Available online 22 August 2019

Phys. Lett. B **795** (2019) 266-270

https://www.sciencedirect.com/science/article/pii/S0370269319303922

Discovery of ^{68}Br in secondary reactions of radioactive beams

K.Wimmer[ab], P.Doornenbal[b], W.Korten[c], P.Aguilera[d], A.Algora[ef], T.Ando[a], T.Arici[gh], H.Baba[b], B.Blank[i], A.Boso[j], S.Chen[b], A.Corsi[c], P.Davies[k], G.de Angelis[l], G.de France[m], D.T.Doherty[c], J.Gerl[g], R.Gernhäuser[n], M.Zielinska[c]

Available online 10 August 2019

Phys. Lett. B **797** (2019) 134800

https://doi.org/10.1016/j.physletb.2019.134800

New test of modulated electron capture decay of hydrogen-like ^{142}Pm Ions: precision measurement of purely exponential decay

F.C. Ozturk, B. Akkus, D. Atanasov, H. Beyer, F. Bosch, D. Boutin, C. Brandau, P. Buhler, R.B. Cakirli, R.J. Chen, W.D. Chen, X.C. Chenc, I. Dillmann, C. Dimopoulou, W. Enders, H.G. Essel, T. Faestermann, O. Forstner, B.S. Gao, H. Geissel, R. Gernhauser, R.E. Grisenti, A. Gumberidze, S. Hagmann, T. Heftrich, M. Heil, M.O. Herdrich, P.-M. Hillenbrand, T. Izumikawa, P. Kienle, C. Klaushofer, C. Kleffner, C. Kozhuharov, R.K. Knbel, O. Kovalenko, S. Kreim, T. Kuhl, C. Lederer-Woods, M. Lestinsky, S.A. Litvinov, Yu.A. Litvinovc, Z. Liu, X.W. Ma, L. Maier, B. Mei, H. Miura, I. Mukha, A. Najafi, D. Nagae, T. Nishimura, C. Nociforo, F. Nolden, T. Ohtsubo, Y. Oktem, S. Omika, A. Ozawa, N. Petridis, J. Piotrowski, R. Reifarth, J. Rossbach, R.A. Sanchez, M.S. Sanjari,C. Scheidenberger, R.S. Sidhu, H. Simon, U. Spillmann, M. Steck, Th. Stöhlker, B.H. Sun, L.A. Susam, F. Suzaki, T. Suzuki, S. Yu. Torilov, C. Trageser, M. Trassinelli, S. Trotsenko, X.L. Tu, P.M. Walker, M. Wang, G. Weber,H. Weick, N. Winckler, D.F.A. Winters, P.J. Woods, T. Yamaguchi, X.D. Xu, X.L. Yan, J.C. Yang, Y.J. Yuan, Y.H. Zhangh, X.H. Zhou and the FRS-ESR, ILIMA, SPARC and TBWD Collaborations

Available online 30 August 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

S. Acharya et al

Published 22 August 2019

Phys. Rev. C **100**, 024301

https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024301

Shape coexistence in the neutron-deficient lead region: A systematic study of lifetimes in the even-even $^{188–200}$Hg with the GRIFFIN spectrometer at TRIUMF

B. Olaizola[1,*], A. B. Garnsworthy[1], F. A. Ali[2,3], C. Andreoiu[4], G. C. Ball[1], N. Bernier[1,5], H. Bidaman[2], V. Bildstein[2], M. Bowry[1], R. Caballero-Folch[1], I. Dillmann[1,6], G. Hackman[1], P. E. Garrett[2], B. Jigmeddorj[2], A. I. Kilic[2,†], A. D. MacLean[2], H. P. Patel[1], Y. Saito[1,5], J. Smallcombe[1,‡], C. E. Svensson[2], J. Turko[2], K. Whitmore[4], and T. Zidar[2]

Published 2 August 2019

Phys. Rev. C **100**, 024302
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024302
Properties of γ-decaying isomers in the ^{100}Sn region populated in fragmentation of a ^{124}Xe beam
G. Häfner[1,2,*], K. Moschner[1], A. Blazhev[1], P. Boutachkov[3], P. J. Davies[4], R. Wadsworth[4], F. Ameil[3], H. Baba[5], T. Bäck[6], M. Dewald[1], P. Doornenbal[5], T. Faestermann[7], A. Gengelbach[8], J. Gerl[3], R. Gernhäuser[7], S. Go[9], M. Górska[3], H. Grawe[3], E. Gregor[10], H. Hotaka[11], T. Isobe[5], D. G. Jenkins[4], J. Jolie[1], H. S. Jung[12], I. Kojouharov[3], N. Kurz[3], M. Lewitowicz[13], G. Lorusso[5], R. Lozeva[2], E. Merchan[10], F. Naqvi[14], H. Nishibata[15], D. Nishimura[16], S. Nishimura[5], N. Pietralla[10], H. Schaffner[3], P.-A. Söderström[5], K. Steiger[7], T. Sumikama[17], J. Taprogge[18,19], P. Thöle[1], H. Watanbe[20], N. Warr[1], V. Werner[10,14], Z. Y. Xu[9], A. Yagi[15], K. Yoshinaga[11], and Y. Zhu[11]
Published 5 August 2019

Phys. Rev. C **100**, 024311
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024311
Total absorption γ-ray spectroscopy of niobium isomers
V. Guadilla[1,*], A. Algora[1,2,†], J. L. Tain[1], J. Agramunt[1], J. Äystö[3], J. A. Briz[4], A. Cucoanes[4], T. Eronen[3], M. Estienne[4], M. Fallot[4], L. M. Fraile[5], E. Ganioğlu[6], W. Gelletly[7], D. Gorelov[3], J. Hakala[3], A. Jokinen[3], D. Jordan[1], A. Kankainen[3], V. Kolhinen[3], J. Koponen[3], M. Lebois[8], L. Le Meur[4], T. Martinez[9], M. Monserrate[1], A. Montaner-Pizá[1], I. Moore[3], E. Nácher[10], S. E. A. Orrigo[1], H. Penttilä[3], I. Pohjalainen[3], A. Porta[4], J. Reinikainen[3], M. Reponen[3], S. Rinta-Antila[3], B. Rubio[1], K. Rytkönen[3], P. Sarriguren[10], T. Shiba[4], V. Sonnenschein[3], A. A. Sonzogni[11], E. Valencia[1], V. Vedia[5], A. Voss[3], J. N. Wilson[8], and A.-A. Zakari-Issoufou[4]
Published 9 August 2019

Phys. Rev. C **100**, 024314
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024314
Chirality of ^{135}Nd reexamined: Evidence for multiple chiral doublet bands
B. F. Lv[1,2], C. M. Petrache[1], Q. B. Chen[3], J. Meng[4,5], A. Astier[1], E. Dupont[1], P. Greenlees[6], H. Badran[6], T. Calverley[6,7], D. M. Cox[6,*], T. Grahn[6], J. Hilton[6,7], R. Julin[6], S. Juutinen[6], J. Konki[6,†], J. Pakarinen[6], P. Papadakis[6,‡], J. Partanen[6], P. Rahkila[6], P. Ruotsalainen[6], M. Sandzelius[6], J. Saren[6], C. Scholey[6], J. Sorri[6,8], S. Stolze[6,§], J. Uusitalo[6], B. Cederwall[9], A. Ertoprak[9], H. Liu[9], S. Guo[2], M. L. Liu[2], J. G. Wang[2], X. H. Zhou[2], I. Kuti[10], J. Timár[10], A. Tucholski[11], J. Srebrny[11], and C. Andreoiu[1]
Published 12 August 2019

Phys. Rev. C **100**, 024317
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024317
Core-polarization effects and effective charges in O and Ni isotopes from chiral interactions
Francesco Raimondi[1,2] and Carlo Barbieri
Published 12 August 2019

Phys. Rev. C **100**, 024323
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024323
Isomer spectroscopy in ^{133}Ba and high-spin structure of ^{134}Ba
L. Kaya[1,*], A. Vogt[1], P. Reiter[1], M. Siciliano[2,3,4], N. Shimizu[5], Y. Utsuno[5,6], H.-K. Wang[7], A. Gargano[8], L. Coraggio[8], N. Itaco[8,9], K. Arnswald[1], D. Bazzacco[10], B. Birkenbach[1], A. Blazhev[1], A. Bracco[11], B. Bruyneel[4], L. Corradi[3], F. C. L. Crespi[11], G. de Angelis[3], M. Droste[1], J. Eberth[1], A. Esmaylzadeh[1], E. Farnea[10,†], E. Fioretto[3], C. Fransen[1], A. Gadea[12], A. Giaz[11], A. Görgen[13,4], A. Gottardo[3], K. Hadyńska-Klęk[3], H. Hess[1], R. Hirsch[1], P. R. John[14], J. Jolie[1], A. Jungclaus[15], V. Karayonchev[1], L. Kornwebel[1], W. Korten[4], S. Leoni[11], L. Lewandowski[1], S. Lunardi[2,10], R. Menegazzo[10], D. Mengoni[2,10], C. Michelagnoli[16], T. Mijatović[17], G. Montagnoli[2,10], D. Montanari[2,10], C. Müller-Gatermann[1], D. Napoli[3], Zs. Podolyák[18], G. Pollarolo[19], F.

Recchia[2,10], J.-M. Régis[1], N. Saed-Samii[1], E. Şahin[13], F. Scarlassara[2,10], K. Schomacker[1], M. Seidlitz[1], B. Siebeck[1], P.-A. Söderström[20], A. M. Stefanini[3], O. Stezowski[21], S. Szilner[17], B. Szpak[22], E. Teruya[23], C. Ur[10], J. J. Valiente-Dobón[3], K. Wolf[1], K. Yanase[23], N. Yoshinaga[23], and K. O. Zell[1]
Published 14 August 2019

Phys. Rev. C **100**, 024329
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024329

Pairing properties of the double-β emitter ^{116}Cd
D. K. Sharp[1,*], S. J. Freeman[1], B. D. Cropper[1], P. J. Davies[1], T. Faestermann[2,3], T. M. Hatfield[1], R. Hertenberger[4], S. J. F. Hughes[1], P. T. MacGregor[1], and H.-F. Wirth[4]
Published 21 August 2019

Phys. Rev. C **100**, 024602
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024602

Elastic scattering for the ^{8}B and ^{7}Be+^{208}Pb systems at near-Coulomb barrier energies
M. Mazzocco[1,2,*], N. Keeley[3], A. Boiano[4], C. Boiano[5], M. La Commara[6,4], C. Manea[2,†], C. Parascandolo[4], D. Pierroutsakou[4], C. Signorini[1,2], E. Strano[1,2], D. Torresi[1,2,‡], H. Yamaguchi[7], D. Kahl[7,§], L. Acosta[8,9,‖], P. Di Meo[4], J. P. Fernandez-Garcia[9,¶], T. Glodariu[10,#], J. Grebosz[11], A. Guglielmetti[12,5], Y. Hirayama[13], N. Imai[7,13], H. Ishiyama[13], N. Iwasa[14], S. C. Jeong[13,15], H. M. Jia[16], Y. H. Kim[13], S. Kimura[13,**], S. Kubono[7,17], G. La Rana[18,4], C. J. Lin[16], P. Lotti[2], G. Marquínez-Durán[8], I. Martel[8,19], H. Miyatake[13], M. Mukai[13], T. Nakao[7], M. Nicoletto[2], A. Pakou[20], K. Rusek[21], Y. Sakaguchi[7], A. M. Sánchez-Benítez[22,23], T. Sava[10], O. Sgouros[20,‡], V. Soukeras[20,‡], F. Soramel[1,2], E. Stiliaris[24], L. Stroe[10], T. Teranishi[25], N. Toniolo[26], Y. Wakabayashi[17], Y. X. Watanabe[13], L. Yang[16,7], Y. Y. Yang[27], and H. Q. Zhang[16]
Published 1 August 2019

Phys. Rev. C **100**, 024902
https://journals.aps.org/prc/abstract/10.1103/PhysRevC.100.024902

Centrality and pseudorapidity dependence of the transverse energy density in pPb collisions at $\sqrt{s_{NN}}$=5.02 TeV
A. M. Sirunyan *et al.*
Published 1 August 2019

Phys. Rev. Lett. **123**, 082501
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.123.082501

Direct Observation of Proton Emission in ^{11}Be
Y. Ayyad[1,2,*], B. Olaizola[3], W. Mittig[2,4], G. Potel[1], V. Zelevinsky[1,2,4], M. Horoi[5], S. Beceiro-Novo[4], M. Alcorta[3], C. Andreoiu[6], T. Ahn[7], M. Anholm[3,8], L. Atar[9], A. Babu[3], D. Bazin[2,4], N. Bernier[3,10], S. S. Bhattacharjee[3], M. Bowry[3], R. Caballero-Folch[3], M. Cortesi[2], C. Dalitz[11], E. Dunling[3,12], A. B. Garnsworthy[3], M. Holl[3,13], B. Kootte[3,8], K. G. Leach[14], J. S. Randhawa[2], Y. Saito[3,10], C. Santamaria[15], P. Šiurytė[3,16], C. E. Svensson[9], R. Umashankar[3], N. Watwood[2], and D. Yates[3,10]
Published 22 August 2019

Phys. Rev. Lett. **123**, 092501
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.123.092501

Ab Initio Optical Potentials and Nucleon Scattering on Medium Mass Nuclei
A. Idini[1,2], C. Barbieri[1], and P. Navrátil[3]
Published 26 August 2019

Phys. Rev. Lett. **123**, 092502
https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.123.092502

Towards the Limits of Existence of Nuclear Structure: Observation and First Spectroscopy of the Isotope ^{31}K by Measuring Its Three-Proton Decay

D. Kostyleva[1,2,*], I. Mukha[1], L. Acosta[3,4], E. Casarejos[5], V. Chudoba[6,7], A. A. Ciemny[8], W. Dominik[8], J. A. Dueñas[9], V. Dunin[10], J. M. Espino[11], A. Estradé[12], F. Farinon[1], A. Fomichev[6], H. Geissel[1,2], A. Gorshkov[6], L. V. Grigorenko[6,13,14], Z. Janas[8], G. Kamiński[15,6], O. Kiselev[1], R. Knöbel[1,2], S. Krupko[6], M. Kuich[16,8], Yu. A. Litvinov[1], G. Marquinez-Durán[17], I. Martel[18], C. Mazzocchi[8], C. Nociforo[1], A. K. Ordúz[25], M. Pfützner[8,1], S. Pietri[1], M. Pomorski[8], A. Prochazka[1], S. Rymzhanova[6], A. M. Sánchez-Benítez[19], C. Scheidenberger[1,2], H. Simon[1], B. Sitar[20], R. Slepnev[6], M. Stanoiu[21], P. Strmen[20], I. Szarka[20], M. Takechi[1], Y. K. Tanaka[1,22], H. Weick[1], M. Winkler[1], J. S. Winfield[1], X. Xu[23,2,1], and M. V. Zhukov[24]

Published 29 August 2019

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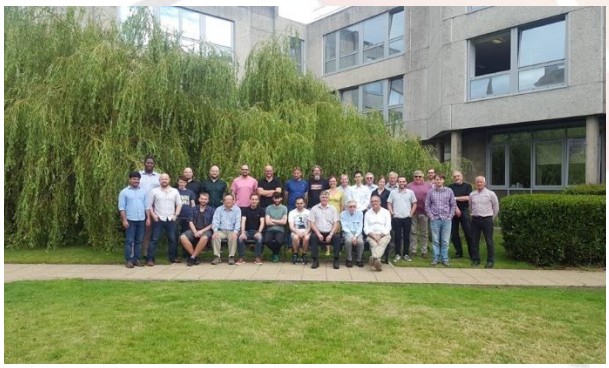
2. News to Report

a. Nuclear Octupole Workshop

The University of the West of Scotland's nuclear group has hosted, July 25th and 26th, a workshop on the nuclear octupole degree of freedom. For the workshop 27 academics from all over the world gathered to present their work towards the octupole degree of freedom and related topics, such as the violation of fundamental symmetries by odd-electric moments. In the spirit of a workshop the presentations were followed by lively discussions. The event was financially supported by the IOP Nuclear Physics Group and logistically by the IOP and UWS events & conference teams



Workshop participants.

Contribution by Marcus Scheck
(University of the West of Scotland)

b. Nuclear Summer School

The joint 75th SUSSP and 20th STFC Summer School in Nuclear Physics and its Applications was held at St Andrews University, 5th-17th of August, organised by Daria Sokhan (Glasgow) and Alessandro Pastore (York). It followed the International Nuclear Physics Conference which ran in Glasgow and we are delighted to report that it was a great success, with the largest number of attendees to date: 59 students, out of which 46 were from the nine UK nuclear physics groups (33 of them STFC-funded) and 13 came from institutions outside of the UK: Armenia, Germany, India, Italy, Poland/Russia, Slovenia, South Africa and Switzerland.

The residential school consisted of nine intense days of lectures, hands-on tutorials, student talks (every student gave a short presentation on their research) and extended discussion sessions with the lecturers, which were very lively and appreciated by the students. The topics covered the full range of the main nuclear physics research and were delivered by experts at the forefront of their field, from the UK, France, Germany, Italy, USA, Canada and Japan (although this lecturer moved to Spain just before the school!). A new element of the school, which we introduced this year, was hands-on tutorials, rather than traditional exercise sessions. A team of four excellent tutors from Edinburgh, Liverpool and York developed and supervised a set of three software projects: one focussed on theoretical calculations (Pierre Becker), one on detector simulations (Nick Zachariou) and an extended one on data analysis (James Smallcombe and Ruchi Garg). The students did all of the projects on rotation, thus being introduced to aspects of research which they might not otherwise engage in. The feedback was overwhelmingly positive — and we're very grateful to our tutors for their excellent efforts!

Summer school participants

Many thanks also to Christian Diget (York) for running the outreach session, part of which involved a competition for the best description of their project using the "TenHundred" words. Well done to Patrick Macgregor (Manchester) for winning this!

The Institute of Physics provided prize funds for the three best student talks of the summer school. The overall standard of student talks was extremely high and first prize went to Ruth Newton (York), second prize to Sarah Fisher (Manchester) and third prize to Matthew Brunet (Surrey). Congratulations to all three!

A career panel convened on one of the evenings provided insight into careers in the Nuclear Data Network, medical physics in the NHS, physics roles in the defence industry and careers in the quantitive sector of banking — as well as academia, and the (two-way) transition between industry and academic roles.

A few hours of free time in the afternoon allowed the students some daylight relaxation to take advantage of St Andrews and there was a day "off" after every three days "on". One of these two days was left entirely free, with some students going to Edinburgh for the Fringe Festival. During the other day, an excursion was organised to Stirling (with entry to its castle), which coupled with the excellent weather made for a wonderful day. The school finished with a send-off dinner (followed by a disco, DJ'd by the school attendees!) in the Hotel du Vin.

The bulk of school funding, which also fully supported all of our STFC students, came from STFC. Generous support from SUSSP and SUPA allowed us to waive the fees of the five attendees from outside of Europe and almost entirely subsidise two from European institutions, which enabled them to attend. Funding from the SUPA PEER initiative allowed us to invite five lecturers from the EU. We also gratefully acknowledge Mirion Technologies, who subsidised the welcome reception (held in the historic Lower College Hall) and provided materials for the welcome packs and Kromek, who supplied USB sticks for all attendees.

https://sites.google.com/a/york.ac.uk/uknpss2019/

Contribution by Daria Sokhan (University of Glasgow)

c. INPC Glasgow

The International Nuclear Physics Conference (INPC) 2019 was held 29th July – 2nd August 2019 at the Scottish Event Campus in Glasgow. INPCs are held every three years and cover a wide and diverse range of nuclear physics topics.

http://inpc2019.iopconfs.org/home
Contribution by James Benstead (AWE)

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3. Outreach Activity

World Space Week: Guildford 5th October

World Space Week (https://www.worldspaceweek.org/) is the largest space event celebrated 4th-10th October annually. In 2018 more than 5,000 events were celebrated in over 80 countries around the world. This year the IoP South Central Branch and the University of Surrey have teamed up to take-over the Guildford high street on 5th October 2019 as part of the World Space Week celebrations. From 9am-9pm Guildford high street will host a plethora of space-themed activities that will be **free** to participate in. The event aims to get more people exploring the high street, interacting with new people, enjoying a bit of science entertainment and hearing about all the amazing research that takes place locally to Guildford, hopefully reaching people who wouldn't normally seek to interact with science activities.

In the lead up to the event the IoP SCB have opened a space art competition, and are looking for mixed media entries from KS1 and 2, and photography entries from KS3 and 4. If you know anyone in these key stage groups who is looking for something to do over the Summer the deadline for the competition is 20th September. All entrants will be invited to a prize giving on 5th October in Guildford, and artwork will be displayed throughout the day as well. For more information please contact publicengagement@surrey.ac.uk, and more details including where to send your artwork can be found here.

On the 5th October there will be a wide variety of activities on offer including star gazing, physics busking, street stalls, a pub quiz, a public lecture, an orchestral performance and so much more, there will be something for everyone. Many high street businesses will also be involved (some charging a small entry fee at their usual rate) including the Unplug&Play boardgame café who will be featuring space-themed boardgames throughout the day, and for a free snack pot use the code "Alpha Centauri". An event page for World Space Week Guildford has been setup here, please mark yourself as interested/going for regular updates leading up to the event including times and locations of the various activities planned, and please share the event with friends and family. Leaflets with the times and locations of various activities, as well as a map, will also be available on the day, we hope to see you there!

World Space Week OCTOBER 4-10

Contribution by Chantal Nobs (CCFE)
chantal.nobs@ukaea.uk

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4. Media Interactions

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