Centre for Nuclear Engineering

Newsletter

Feb 2016

Welcome to this edition of the Centre for Nuclear Engineering's (CNE) Newsletter.

The Newsletter contains the latest information on the Centre's activities and achievements.

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Updates

ed.: Jonathan Tate design: Edoardo Giorgi

Student development

It has been a very busy past few months for students connected to the CNE, who have travelled around England participating in several events.

First, Richard Pearson, John Brokx, Mark Mawdsley and Alex Kenrich from ICO-CDT Cohort 1 and Kathryn Yates from Cohort 2 attended the Joint Fission-Fusion Symposium in Manchester on December 14 2015. Held for the NGN and ICO CDT centres, the day consisted of lectures from experts in the fields of fission and fusion, student posters, and a panel debate comparing and contrasting these two technologies.

Following on quickly from the holiday season, between the 6th and 8th of January 2016 both cohorts stayed in Birmingham for the joint CDT Winter School. Alongside enriching talks from academics, industry, and public figures, Cohort 1 submitted posters showing their latest research, while Cohort 2 gave short presentations introducing themselves and the projects they had been assigned. We thank Manchester for making the School such a success, and congratulate the students.

After a weekend's rest, Cohort 2 and students on the Nuclear Engineering MSc then stayed in Cambridge over January 11th to 13th for the Nuclear Policy module. Co-ordinated by Prof Bill Nuttall of the Open University, the three days consisted of a series of lectures that explored in great detail nuclear policy, with a strong focus on the UK. Students were also treated to an afternoon at the Cambridge Botanical Gardens. We thank the Open University, the staff at Cintra House, and Bill for their efforts, and wish students good luck on their assignment.

The Royal Angus Hotel, the venue for the joint CDT Winter School.

Seminar Series

On Wednesday 27th January the CNE's Seminar Series commenced. The series kicked off with our own Dr Mike Bluck, who presented on '"Plumbing" or Thermal Hydraulics in Nuclear Fission and Fusion'. Download Mike's lecture slides at: www.imperial.ac.uk/nuclear-engineering/research/research-outputs. The CNE has distinguished speakers booked until June 2016.

Christmas Lecture

The Director of the CNE, Prof Bill Lee, delivered the Centre's Christmas Lecture on the evening of December 16 2015. Entitled 'Why Radionuclides Are Good for You', the lecture highlighted how, contrary to popular perceptions, radioactivity is normally a benign phenomenon, how organic life is adapted to it, and how radionuclides will play an essential role in tackling future technological challenges. Attended by students, academics, and representatives from industry, such as AWE and Rolls-Royce, the lecture concluded with a drinks reception.

Download Bill's lecture slides at: www.imperial.ac.uk/nuclear-engineering/research/research-outputs

Awards, funding, and esteem

Summer Internship

PhD student Matthew Jackson has successfully applied for a summer internship in Japan with Hitachi-GE Nuclear Energy Ltd.

Matthew, whose project title is 'Defect and damage processes in materials for fusion energy applications', will be on the internship from approximately June to September 2016.

Based at Hitachi-City in Ibaraki Prefecture, Matthew will study equipment designs for nuclear power plants. The work involves learning about nuclear standards and regulations, creating specifications and technical manuals, and touring the shop floor. The internship will conclude with Matthew delivering a presentation to the company on what he has learnt.

Scholarship Award

PhD student Dimitri Pletser has been awarded the prestigious Roy G. Foundation Scholarship.

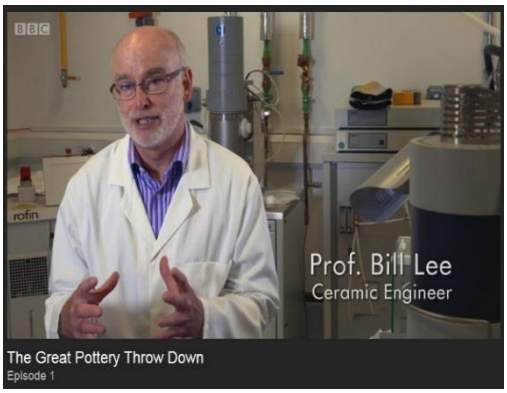
Announced at the end of January 2016, the scholarship is worth $5,000 and includes an expenses-paid visit to the Waste Management 2016 Conference (WM2016) in Phoenix, USA. Taking place over 7 – 10 March, it is at WM2016 that Dimitri will be conferred with his scholarship, and also present his work.

Dimitri, whose research focuses on developing low-temperature glass composite material wasteforms for waste from Fukushima, is supervised by Prof Bill Lee, and is due to submit his PhD in 2017.

TV Appearance

Prof Bill Lee recently appeared in several episodes of the BBC2 reality show The Great Pottery Throwdown.

Broadcast towards the end of 2015, the show pitted ten amateur potters against one another in a bid to be crowned the UK's Top Potter. The winner was decided based upon how well the contestants performed in creating different types of pottery.



Above: Prof Lee explaining to TV audience

Below: Dr Wenman being filmed

Bill featured as the show's ceramics expert, and helped viewers understand and appreciate the science and technical challenges of creating viable ceramic structures.

More information, including Bill's experiences and reflections, can be found at: http://ceramics.org/ceramic-tech-today/communicating-ceramics-through-pottery-and-primetime-tv

Nuclear MOOC

In early January 2016, as part of the new nuclear power MOOC (Massively Open Online Course), Dr Mark Wenman (Imperial) and Prof Bill Nuttall (Open University) were filmed at the Open University. The MOOC will be a five-week course and open to anyone through Future Learn. Aimed at graduates, it will provide the opportunity to learn about many aspects of nuclear power – such as its history, reactor physics, nuclear safety culture and accidents, and the economics of new build.

Filming took place using a full blue screen and autocue. Recordings included audio voice overs (recorded in broom cupboards), and it is fair to say both Mark and Bill have a newfound respect for the work of newsreaders. The MOOC will launch around July 2016.

Catching up with Patrick Burr

Former PhD and CNE student Patrick A. Burr was recently appointed Lecturer in Nuclear Engineering at the University of New South Wales (UNSW), Sydney, Australia. There, he will be teaching part of the MSc on Nuclear Engineering that was launched two years ago with the support of the CNE.

'The opportunity for this job came thanks to the CNE's connections' Patrick stated. 'Every year selected members of the CNE travel to Sydney to deliver some of the MSc course. During one of these visits Prof Robin Grimes introduced me to the MSc Course Co-ordinator Prof John Fletcher. Soon after, John encouraged me to apply for the vacancy, in which fortunately I was successful.'

Patrick Burr

Patrick's research focuses on atomic-scale modelling of Zr alloys, Be alloys, and accident-tolerant fuels. He has recently started collaborations with experimental researchers from the Australian Nuclear Science and Technology Organisation (ANSTO), as well as other academics from UNSW, including Dr Hassan Tahini (an Imperial graduate) and Prof Sean Smith. Patrick continues to collaborate with CNE members past and present, and wishes to sustain this relationship by perhaps supervising Masters students that wish to do a placement at UNSW. Beyond academic life, Patrick is making the most of his new surroundings by frequenting the beautiful Coogee beach – a 20 minutes' walk from campus.

Reflections on Fission-Fusion Symposium

In December 2016 CDT Cohort 2 student Kathryn Yates attended the Joint Fission-Fusion Symposium in Manchester, and offers some reflections on the event.

The symposium began with a talk from Professor Steve Roberts of Oxford University about current fusion research at the Joint European Torus (JET) facility in Culham. JET is used for testing plasma physics and materials for use in the International Thermonuclear Experimental Reactor. 'Steve discussed the challenges still facing fusion researchers', Kathryn recounted 'and the potential of this technology for future power generation.'

Kathryn Yates

The distinguished nuclear expert and visiting professor at Imperial Dame Sue Ion then presented on the UK's current and future nuclear capacity, including the opportunities relating to the recent Chinese investment in a plant at Hinckley Point. 'Sue was optimistic about the UK's nuclear future', Kathryn said, 'and ensured us we should be spoiled for jobs by graduation!'

After lunch, there was a panel discussion with Steve, Sue, Prof Francis Livens from Manchester, and Prof Howard Wilson from York. They discussed the audience's questions about fission and fusion capabilities, and stressed the importance of the CDT initiatives in training a new generation of nuclear scientists.

As Kathryn is fairly new to the world of nuclear research, she found the Symposium, and particularly Steve and Sue's presentations, 'very interesting'. 'Our Masters does not include any fusion lectures', Kathryn commented, 'so it was very useful that Steve described fusion basics before talking about the research at Culham. It was great also to hear from Sue, who has worked in the UK nuclear industry for most of her life, and to listen to her past experiences and her thoughts on the future.' Kathryn also benefited from the opportunity to network with other Nuclear Energy cohorts.

CNE Latest Research Outputs

A Galinstan-filled Capillary Probe for Thermal Conductivity Measurements and its Application to Molten Eutectic KNO_3-$NaNO_3$-NO_2 (HTS) up to 700K

Le Brun N and Markides C
International Journal of Thermophysics (2015)

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Influence of Alloying Additions on the Corrosion of Zr Alloys

Bell BDC, Murphy ST, Burr PA, Grimes RW, and Wenman MR
Corrosion Science (2016)

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Diffusion-based and Creep Continuum Damage Modelling of Crack Formation during High-temperature Oxidation of ZrN Ceramics

Pettina M, Harrison RW, Vandeperre L, Biglari F, Brown P, Lee WE, and Nikbin K
Journal of the European Ceramic Society (2016)

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