

## Nuclear Energy Building UK Civil Nuclear Skills

### Imperial . Cambridge . Open

### $CDT \rightarrow MRes + PhD$

CDT (4 years) = MRes (1 year at Imperial) + PhD (3 years at either Imperial, Cambridge or Open)

> £4M funding from EPSRC Training 62 PhD students in 5 cohorts Fully supported by nuclear industry and internation partners



ICO Student Conference Imperial College 15 July 2015

### http://www.imperial.ac.uk/nuclearcdt









# Year 1: MRes in Nuclear Engineering @ Imperial

1/2 Short Courses

## 5/6 Core Modules





# Year 2-4: PhD

Chemical Engineering Chemical Engineering 30+ Projects Listed @ http://www.imperial.ac.uk/nuclearcdt/projects

- Significant industry support (18+ projects):
  - Rolls-Royce, Hitachi, AWE, NNL, Sellafield, NDA, Tokamak Solutions, EdF
- 30+ Academics involved in many areas of civil nuclear energy
- Working at Imperial and/or Open and/or Cambridge

Imperial College

London



















# **Cohort activities**

#### CONSORT Reactor Centre Visit Silwood Park 15 December 2016

A joint visit for all MSc and CDT students

Institute for Nuclear Research Romania June 1-3 2016



The Institute for Nuclear Research Pitesti was founded in 1971 as a unit of strategic importance, having as field of activity the scientific research, design, technological development and scientific and technical responsibility for the development of nuclear energy in Romania.

#### The Halden Reactor Norway May 26-28 2015

The Halden Reactor is a 25MW nuclear reactor located in Halden, Norway and dedicated for research. The reactor became operative in 1958, and is operated by the Institute for Energy Technology.

#### ICO Student Conference Imperial College 7 July 2016



Student led and organised. Attended by ~60 academics, students, government reps and industry partners. Speakers from across the UK nuclear spectrum. Hailed a great success from attendee feedback



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# **Cohort activities**

Cohort Building / Extra Curriculum Activities Winter School Manchester 6-8 January 2015 Birmingham 6-8 January 2016 NGNCDT

Joint Winter School organised by Manchester CDT Next Generation Nuclear and ICO CDT to create a forum for discussion and interaction for all Nuclear CDT students and staff in the UK

#### Nuclear Energy Policy Course Open University 9-11 January 2017

OU Energy

Explores energy policy issues facing the future of

nuclear energy. Emphasis given to considerations affecting nuclear new build. The main context considered was the UK within the European Union although many lessons will be relevant to other energy markets.





# **Projects**

### Cohort 1

Alan Charles: Multi-Objective Optimization

Mark Mawdsley: Pressurized Water Reactor In-core Nuclear Fuel Management by Tabu Search

Sophie Morrison: The Use of Thorium Fuelled Light Water Reactors to manage UK's Plutonium Stockpile

Andrew Wilson: Advanced Gas-Cooled Reactors as Precursors to the Very High Temperature Reactor

Richard Pearson: Assessment of the Technological Challenges and Opportunities Concerning Tritium Supply and Demand in Small Tokamaks

John Brokx: Pseudo-Strains in Near Surface Residual Stress Measurements

William White: The Effect of Hydrogen on the Mechanical Properties of Steel

Alexandros Kenich: Atomistic Simulations of Pellet-Cladding Interactions

### Cohort 2

Nathaniel Read: Modelling Thermo Mechanical Reactivity Feedback in Fast Reactors

Peilong Dong: Additive manufacturing of metallic components Thomas Whiting: Experimental set-up of an irradiation programme for reactor pressure vessel steels at ANSTO

Dhan-Sham Rana: Development of layered zirconium carbide materials for accident tolerant nuclear fuels using element specific spectroscopy

Lloyd Jones: Peridynamics Modelling of Oxide Failure on Nuclear Fuel Cladding

Giles Rought-Witta: Chemical and Radiolytic ageing of UO2 and PuO2

Said El Chamaa: New Routes to Multi-metallic Nano- and Bulk-Materials Containing*f*-block Elements

Elizabeth Yates: An Investigation of He Mobility and Bubble Formation in FCC Metals

Robby Lyons: SMR reactor supply chain design



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#### • Future research areas:

- Accident tolerant fuels
- Wasteforms for Fukushima wastes
- Small, Modular Reactors (SMRs)
- Fast reactors
- Thermal hydraulics modelling of boiling, prediction of CHF
- Radiation transport & reactor physics
- Fusion technology
- Student recruitment
- Expansion of industry support
- Mid-term review
- Next CDT round