



The University of Manchester
Dalton Nuclear Institute

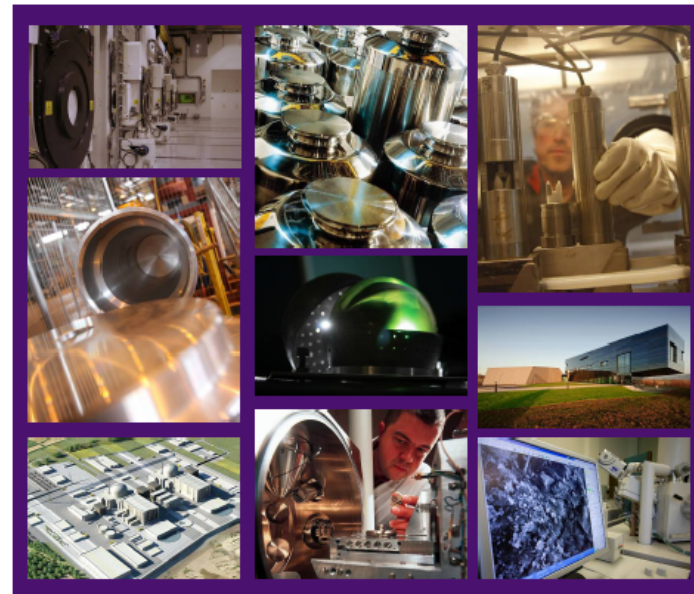


National Nuclear User Facility



Industrial strategy: government and industry in partnership

The UK's Nuclear Future



National Nuclear User Facility

- In March 2013 Nuclear Industrial Strategy, Government announced National Nuclear User Facility (NNUF) initiative
- A multi-site facility to give academia and industry access to experimental equipment for nuclear research on materials with greater radioactivity than can be handled in universities
- £15M over three years from 2012/13, from DECC and BIS via EPSRC. For facilities at the Central Laboratory of NNL, CCFE and the University of Manchester's Dalton Cumbrian Facility
- In late 2013 ADRIANA nuclear instrumentation project was funded (DECC/EPSRC) - £1M at Lancaster, Liverpool, CCFE
- NNUF Management Committee chaired by Robin Grimes
- www.nnuf.ac.uk – just launched

NNUF Workshop on 1 Sept - Agenda

1. Current NNUF status - equipment and access
 - Culham Centre for Fusion Energy (CCFE) – Martin O'Brien
 - Dalton Cumbrian Facility – Kevin Warren
 - National Nuclear Laboratory (NNL) – Dominic Rhodes
 - ADRIANA instrumentation – Malcolm Joyce (Lancaster)
2. Developing a national archive of irradiated and activated materials - Steve Roberts (Oxford) / Peter Flewitt (Bristol)
3. Transporting irradiated/activated materials – Mike Angus (NNL)
4. New NNUF Proposals – Kevin Warren and Martin O'Brien

Use of NNUF Facilities

1. Please include use of NNUF equipment in your EPSRC grant bids
2. Speak to hosts about costing and other issues
 - Job specific costs - will be very dependent on what you want done, so in general can't give a day rate for a piece of equipment
 - Transport of materials
 - Etc.
3. Plus non-EPSRC-grant work? e.g. for industry?

CCFE Materials Research Facility

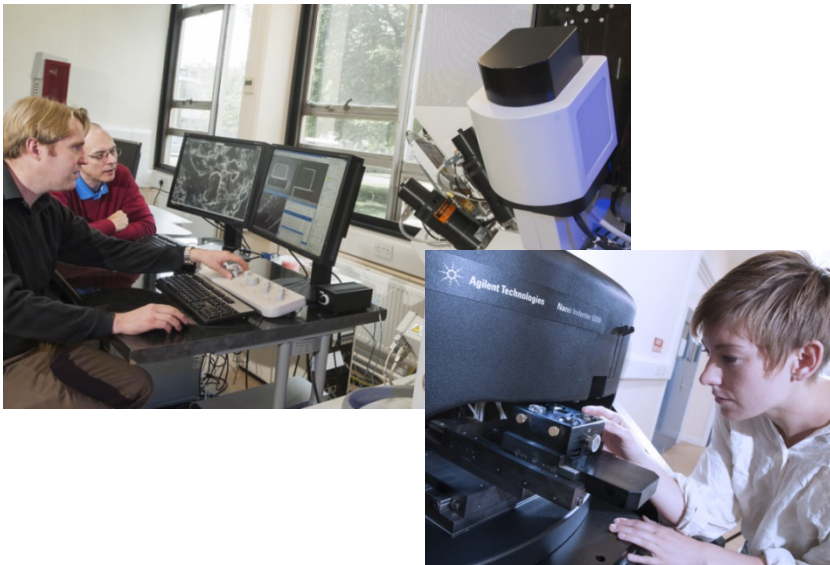


Intermediate between universities and NNL.
Up to $\sim 1\text{TBq}$

Process active material for analysis at university or on-site:

- Dual beam FIB
- Nanoindenter
- SEM (EDS, EBSD, TKD)
- Thermal Desorption Spectroscopy
- workshop and experimental areas

Should be open this time next year



Meanwhile, equipment available for non-active work. Bristol, Manchester, Oxford, CCFE have used it for a range of R&D.

See Martin O'Brien

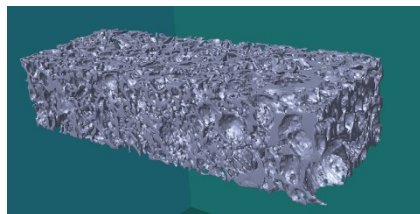


NNL

- Field Emission Gun Transmission Electron Microscope – delivery May 2015
- Focused Ion Beam – operational (not yet active samples)
- FEGTEM and FIB to be in new suite of labs



- X-Ray Micro-tomography already in use in active lab (Leeds, Manchester, NNL), e.g. for



- porosity of AGR core graphite
- carbon deposits on AGR fuel pin

Various access arrangements possible – **see Dominic Rhodes**



Dalton Cumbrian Facility

Large scale irradiation facilities

- 5 MV tandem ion accelerator
- Dual beam system incorporating new 2.5MV accelerator (2015)
- Beamline hot cell to enable increased damage depth and damage rate experiments
- High energy ^{60}Co gamma irradiator



On site material preparation and PIE including; highly spec'd FEGESEM, 2D XRD, Time-domain thermoreflectance, FT-IR Raman, Spark Plasma Sintering, HT Vacuum Furnace etc

Ability from 2015 to transfer activated materials samples to CCFE & NNL Central Lab for further processing/inspection



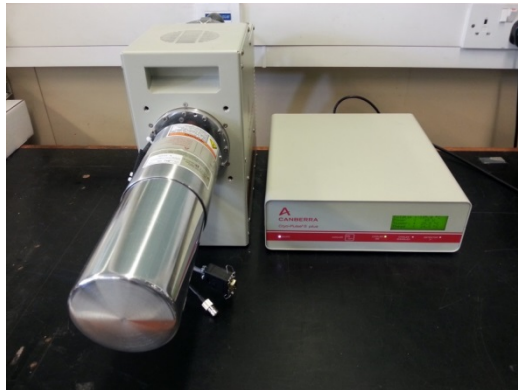
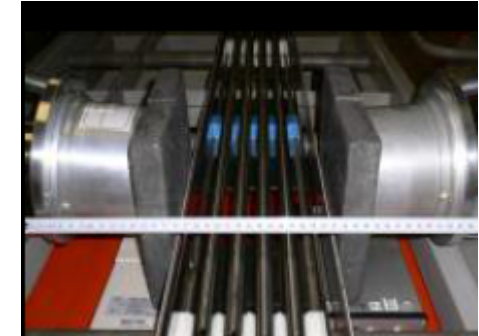
Present users include: Sheffield, Warwick, York, Keele, Glasgow, Birmingham & Humboldt universities, NNL, Sellafield Ltd, Rolls Royce

See Kevin Warren

ADRIANA

(Advanced Digital Radiometric Instrumentation for Applied Nuclear Activities)

Lancaster -
High-order neutron multiplicity analysis
of actinide materials (32 channel array)



Liverpool - spectroscopic imaging & location of γ
contamination



CCFE - three Ultra-low background γ -ray
spectroscopy systems, one portable

Procurement spring 2014, some equipment already operational:

M Joyce (Lancaster), P Nolan & L Harkness Brennan (Liverpool), S Lilley (CCFE)

