



## Dalton seminar: Sharing the breadth of nuclear research at Manchester

**Thursday 25 June 2020**

**14:00-16:20**

Name	Title	Abstract
<p><b>Francis Livens</b> Director of Dalton Nuclear Institute</p>	<p>Compositional and Structural Evolution of Plutonium Dioxide: Underpinning Future Decisions</p>	<p>The UK has the World's largest civil stockpile of plutonium which will be stored as PuO<sub>2</sub> powder for some decades before being used in fuel and/or disposed as waste. During storage, this material will change in many ways, and we are interested in understanding how it evolves and the implications for end use.</p>
<p><b>Richard Wakeford</b> Health and Medical</p>	<p>Radiation Risk Issues and their Potential Impact on Radiological Protection</p>	<p>The system of radiological protection is based on the available scientific evidence of risks to health at low levels of exposure to radiation. An indication that these risks have been underestimated could lead to a stricter protection regime carrying increased costs, and <i>vice versa</i>. The Center for Occupational and Environmental Health (COEH) has conducted, and is conducting, a number of epidemiological studies of exposed people, including nuclear workers. The talk will indicate some of the current challenges to radiological protection and the studies at COEH that have addressed, and are addressing, these challenges, and what might be done in future</p>
<p><b>Simon Watson</b> Decommissioning</p>	<p>Robotics for Nuclear Decommissioning</p>	<p>This presentation will provide an overview of the robotic platforms which have been developed at the University to support</p>

		nuclear inspections and decommissioning at sites across the world, including facilities in the UK, Japan, Slovenia and Finland. Work will be presented from projects such as the RAIN Hub, RNE and Torone and will cover ground and aquatic robots including Carma, Vega, MIRRAX, AVEXIS and Mallard.
<b>Joel Turner</b> Fuel and Fuel Cladding	Accident Tolerant Fuels; The Basis of a Research Programme	An overview of why there is currently an international effort to develop accident tolerant fuel materials, what this means for uranium-bearing materials and how the nuclear fuels group is developing the next generation of these compounds.
<b>Louise Natrajan and Dave Mills</b> Fuels, Environment and Waste and Recycle	Actinide Research in the Centre for Radiochemistry Research (CRR)	We present an overview of actinide research in the CRR and its application across a wide range of themes including nuclear fuels, recycling, environment and waste. We focus on molecular chemistry, where studies of compounds with unusual structure and bonding, and physicochemical properties can provide exemplar information on bonding differences that may be transferred to nuclear fuel cycles, and where their precise compositions provide models for nuclear fuels and compounds in the natural and engineered environment. We exploit the optical properties of selected compounds in environmental imaging and perform computational studies to deepen our understanding of molecular compounds and materials.
<b>Toby Wright</b> Reactors	Nuclear Data Measurements at the n_TOF Facility	The n_TOF facility, CERN is a world-leading experimental facility for neutron cross section measurements. I will give an overview of the University of Manchester's involvement with the n_TOF collaboration focusing on recent measurements we have performed with the STEFF detection setup studying neutron induced fission of <sup>235</sup> U and <sup>239</sup> Pu.
<b>Petra Tjitske Kalshoven</b> Nuclear and Society	Cross-disciplinary Ventures: Nuclear and Social Research	Through a discussion of Cumbria-based artist Wallace Heim's exhibition 'x=2140', which I co-curated at Florence Arts Centre (Egremont, February – March 2020), I reflect

	Engaging with Art Practice	on the potential of cross-disciplinary research ventures. 'x=2140' is an output of the 2019 – 2020 'Sellafield Site Futures' project (sponsored by DNI and UKERC), which saw University of Manchester nuclear and social researchers interacting with interested professionals in West Cumbria to explore possible end states for the nuclear site, which is planned to be fully decommissioned by the year 2140. The exhibition was meant as an intervention to raise awareness and provoke questions for further research.
<b>Anastasia Vasileiou</b> Reactors	Optimisation and AI in Nuclear Manufacturing	Nuclear manufacturing includes welding techniques (e.g. multi-pass arc, autogenous electron beam), additive manufacturing, cladding etc of pedigree materials, some of them undergoing complex metallurgical phase transformations. Modelling is used to predict the thermal cycles, resulting microstructures, resulting residual stress field and distortion. However, with modelling being a multi-step process and with the necessity to model phenomena that spread over multiple scales, running an analysis for multiple passes is computationally intensive and challenging. Industry implements similar models using assumptions that compromise the results' quality. The use optimisation and artificial intelligence/machine learning techniques is being explored for enhancing modelling approach.
<b>Tatiana Grebennikova</b> Recycle	Performance of Structural Materials Under Molten Salt Process Conditions	The industrial application of advanced molten salt technologies in the form of pyroprocessing of spent nuclear fuel and molten salt reactors is currently limited to the lifetime of structural materials used in containment. During the operation, these materials are exposed to a combination of extreme environments such as corrosive salt media, high temperatures and the presence of chemically reactive species while under the intense radiation fields. This study focused on a thorough understanding of the performance of structural materials under molten salt process conditions.

