Poster Abstracts

Name	Abstract
Felicity Maiden	Microwave start-up is a way of switching on a tokamak by injecting microwaves which ionise the hydrogen gas and initiate the plasma current. This is critical for power plants as microwaves have significant engineering and technological advantages over a central solenoid, which is the system currently used to start experimental devices. Links to industry include the development of gyrotrons and waveguide capable of delivering high-power microwaves.
Nicola Lonigro	Multi-wavelength imaging and coherence imaging are new advanced diagnostics that we are using to better understand how plasma behaves in the divertor region. Using cameras to take images of different spectral lines (i.e. colors) allows us to determine 2D maps of electron temperature and density in the divertor. Better understanding of the plasma in this region allows us to optimise the divertor and improve exhaust performance
Cyd Cowley	For next-generation tokamaks, the intense heat and particle loads on material surrounding the plasma is a significant challenge to overcome. There are a number of proposed solutions to this issue of plasma exhaust, one of which is optimizing the shape and design of the structure handling most of these loads - the divertor. This alternative divertor design is core to my project, and this poster focuses on one aspect of divertor optimization: the baffling and divertor closure.
Nour Hammoud	This study investigates the interaction between helium irradiation and tungsten deposition on plasma facing components. Understanding this is important for the STEP device. Tungsten is known for its high melting point and resistance to sputtering. However, under helium irradiation at high temperatures, it forms a nanostructure called "Fuzz", which impacts the first wall surrounding the plasma. The aim of this project is to understand how helium irradiation and tungsten deposition can damage tungsten microstructure.
Robb Kerr	The aim of my project is to understand damage mechanisms in tungsten samples that have been removed from the JET tokamak. A wide array of materials science techniques have been used to look for changes in mechanical properties and small scale features that can be attributed to plasma exposure. The results help predict component lifetimes in future devices such as ITER and STEP but also highlight the importance of assessing a component's condition before installation.
Nick Osbourne	The importance of molecules in plasma detachment in the MAST-U tokamak. 'Detachment' is a state that future tokamak devices must operate in so that the hot particles exhausted from the core do not completely destroy the materials they strike. It can be regarded as simultaneous power, momentum and particle loss in the exhaust plasma as it journeys from the core to the exhaust plates. Molecules are not normally present in the extremely hot plasma in the core of a tokamak but play an important role in the cooler exhaust area where they help with this removal of energy, momentum and ions.
Daniel Greenhouse	The exhaust of heat and particles from fusion plasmas, typically managed by a 'divertor', remains a critical challenge in nuclear fusion. An innovative, integrated data analysis system, based on Bayesian inference, has been developed to combine information from multiple diagnostics. Such a system gives an experimental insight into plasma behaviour in this critical region in a way that individual diagnostics are unable to provide.

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Lizzie Mushangwe	Developing a better understanding of the neutron irradiation of reactor components will help us increase the lifespan of future reactors. Similar to topics you will have covered in the "Materials Technology for Fusion" lecture, I investigate how neutron irradiation introduces defects in structural materials, which increase undesirable traits such as hardness and brittleness. In doing so, I aim to generate empirical data that will be used to create deformation simulations, which will help to guide future material selection.
Yacopo Damizia	This research project looks at the plasma within the divertor of MAST-U to determine the ion temperature and the ion energy distribution function, using a Retarding Field Energy Analyser (RFEA). Measuring the ion temperature is important because it is the energy, characterised by temperature of the ions, which determines the level of damage to materials in the first wall and divertor.
Raska Soemantoro	We are investigating whether NVIDIA Omniverse, a real-time collaborative 3D graphics platform, can be used to help break down barriers between design teams working on different aspects of a tokamak. Omniverse allows teams to collaborate across different organisations and platforms using their own preferred CAD/CAE/CAM packages, helping them work much more efficiently. For this collaboration to work, organisations need to be able to connect their preferred modelling software to the Omniverse, which is done through additional software called an Omniverse Connector. This work presents a Connector for the CAD modelling software FreeCAD, connecting this 3-D modelling programme with the Omniverse Nucleus database, which provides user access control for engineering models, check-pointing and version control capabilities. The resulting connector facilitates the development of an automated CAD defeaturing and preparation tool.
James Tufnail	High temperature superconductors are an essential component in fusion-devices, enabling confinement of the plasma with strong magnetic fields. Large numbers of energetic neutrons in a small area can cause severe structure damage and degrade the performance of the magnets; it is therefore imperative to understand the mechanisms behind this damage in order to develop methods to improve their resilience and extend the lifetime of these critical components.
Greg Stathopoulos	The goal of this project is to further the understanding of the plasma physics in Neutral Beam Injection (NBI) sources by use of computer simulations in C++. The plasma in the NBI source corresponds to a low temperature plasma and improving our understanding on this plasma could aid in improving the NBI source which will be used in ITER without having to pay for costly experiments.
William Smith	The development of future fusion power plants requires a shift towards more interconnected, collaborative approaches that allow for the complexity of the physics and engineering challenges. The industrial metaverse combines the digital and physical worlds, where expensive and time-consuming tasks can be moved from the physical to the digital world. It enables direct collaboration by all organisations in the supply chain, from initial design to manufacture and operation. We propose using a system of workflows that allows industry-standard tools to be easily combined, re-configured, and integrated into NVIDIA Omniverse, an innovative 3D platform designed to create digital twins.