Contribution ID: **3** Type: **Talk**

Increasing the heat: Developing the next-generation of high-temperature steels to deliver commercial fusion energy

Wednesday 4 February 2026 10:15 (30 minutes)

As the UK nuclear 'renaissance'continues apace, steels continue to demonstrate incredible versatility and performance, particularly as we consider next-generation structural materials to use in the most demanding environments ever developed. Proposed commercial fusion powerplants contain plasmas ten times hotter than the sun, with materials witnessing extreme levels of radiation damage. This is coupled with challenging mechanical loads, and other environmental factors such as corrosion. Yet nano-structuring and carefully designed steel microstructures can be tuned to manage these effects.

A LIBRTI-funded, UK consortium, NEURONE (Neutron Irradiation of Advanced Steels), operating across academia, national labs and industry are tackling the challenge of developing steels to use in fusion plants, and utilising existing national infrastructure to deliver the tonnages of material required for commercial fusion plant breeder blankets, by the end of the decade. This talk will explore some of the key challenges we face within this programme, as well as the science behind the steels being developed. Importantly, the immediate opportunities for wider industry engagement in this emerging sector will be outlined.

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Session Classification: Session 2-5

Track Classification: LIBRTI Conference