

ID: 1.3.2a

Title: The unreasonable effectiveness of mathematical models for nuclear materials.

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The presentation will highlight the dominant role of the atomic scale in the hierarchy of multiscale mathematical modelling methods, involving electronic-, magnetic-, atomistic-, mesoscopic- (Langevin and Monte Carlo) and dislocation-dynamics-based approaches. I shall also outline a range of outstanding issues in the field of radiation stability of iron-based alloys and steels that have recently been addressed and partially resolved using new mathematical concepts and algorithms, validated by dedicated experiments.