

Modelling Realistic Neutron & Gamma Sources in Fusion Plasma

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Neutron emission in the fusion power operational phase of ITER, with Deuterium and Deuterium-Tritium (DT)-burning plasmas demonstrating high fusion gain, will be complex to measure and compute both from the perspective of the total yield and neutron spectrum shape. An accurate assessment of ITER's neutron emission characteristics and their uncertainties needs to be performed in view of the plans for commissioning, absolutely calibrating, and operating neutron and gamma diagnostics needed to execute ITER 's FPO phase.

We will be presenting a summary of the recent work done on modelling of realistic neutron and gamma sources, their coupling to Monte Carlo neutron transport codes, and relevancy for detector calibration. In the talk we will address the following topics - we will begin with a description of the motivation for the development of the modelling methodology and the computational workflow. We will then describe the application, validation, and major conclusions of the plasma neutron and gamma source analyses at JET, and the currently ongoing analysis of ITER PFPO p+Be radiation source. We will conclude with a discussion on the applicability of the methodology to detailed source studies for ITER FPO and the option for development of synthetic diagnostics.