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P2.210 Neutron induced Primary knock on spectra and displacement damage on fusion reactor materials (W Fe Cr Cu& Al) at energies up to 14.1 MeV energy

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Interactions of 14.1 MeV energy neutrons with fusion reactor materials will result into the production of energetic recoils (primary knock on atoms) that lead to displacement damage in the reactor materials. These neutrons will yield different recoils atoms species of different energy and mass based on different reaction channels. Prediction of displacement per atom (dpa) requires energy spectra of PKA from all probable reaction channels. In the present work, PKA spectra have been calculated for neutrons induced reactions on stable isotopes of Tungsten, Iron, Chromium, Copper, and Aluminum at up to 14.1 MeV energy from all possible reaction channels with optimized nuclear model parameters. PKA spectra are later used in NRT (Norgett Robinson and Torrens), BCA (Binary collision approximation) and BCA+MD (molecular dynamics) approach to calculate the displacement cross section. Reaction cross section of different reaction channels and energy spectra of emitting neutrons, protons and alpha particles are calculated and compared with the existing experimental data from EXFOR data library to select the best fitted nuclear models and parameters. All the reactions modes namely compound nuclear, pre-equilibrium, direct and multiple emission mechanisms have been taken into consideration for cross-section calculations. TALYS-1.8 code has been used for the cross-section calculations and IOTA code has been used for the BCA and BCA+MD simulations.

Presenter: RAJPUT, Mayank (Institute for Plasma Research)**Session Classification:** P2