Contribution ID: **256** Type: **Poster**

Upgrading algorithm of the Monte Carlo Simulation of Atom Displacements (MCSAD) induced in solids under high fluency electron and gamma irradiation environments

Tuesday, 24 October 2017 15:45 (15 minutes)

The Monte Carlo Simulation of Atom Displacement, MCSAD, algorithm and code have been developed and applied in solid materials for the assessment of electron and gamma radiation damage. In the code, single primary knock-on atom (PKA), processes are taken into account in regard to atom displacement (AD) occurrences, which give a well-suited description of radiation damage effects on relative low particle fluency irradiation environments. In addition, target matrix main properties on regard with electron and gamma quanta transport are assumed to remain constant during the radiation transport, it means that, and consequently, material related atom displacement threshold energies and density consequently do not change at different calculation history trails, which supposes a weak radiation damage effects on the target properties. However, under high brightness and fluency irradiation environments, the foregoing MCSAD algorithm and code assumptions are not adequate for describing progressive and intensive radiation damage effects on a given target matrix.

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Session Classification: Poster Session - NUC

Track Classification: Nuclear Structure, Nuclear Reactions and Exotic Nuclei