Contribution ID: **1244** Type: **not specified**

P3.197 FNG Copper Benchmark Evaluation for the SINBAD Database

Wednesday, 19 September 2018 11:00 (2 hours)

Shielding Integral Benchmark Archive and Database (SINBAD) project started in the early 1990's at the Organization for Economic Cooperation and Development's Nuclear Energy Agency Data Bank (OECD/NEADB) and the Radiation Safety Information Computational Center (RSICC) at Oak Ridge National Laboratory (ORNL) with the goal to preserve and make available the information on the performed radiation shielding benchmarks. SINBAD is available from the NEA Data Bank and RSICC. The database comprises now 102 shielding benchmarks, divided into three categories, covering both low and inter-mediate energy particles applications: fission reactor shielding (48 benchmarks), fusion blanket neutronics (31), and accelerator shielding (23) benchmarks.
FNG-Copper benchmark and HCLL mock-up are the first evaluations being prepared after a long pause. The work has been partly funded by the Fusion for Energy - F4E under the Specific Grant Agreement F4E-395-01 and is planned to be followed by other evaluations. The neutronics benchmark experiment on a pure Copper assembly was also performed in the frame of the F4E Task at the 14-MeV Frascati neutron generator (FNG) of ENEA Frascati with the objective to provide validation of the copper nuclear cross-section data relevant for ITER design calculations, including the related uncertainties. A detailed evaluation of the experimental configuration, measurement system and results was performed in the scope of the SINBAD evaluation with a particular focus on a realistic, complete and consistent estimation of uncertainties involved in the measurements and the calculations. Several input models for Monte Carlo (MCNP5) and deterministic (DORT) transport and sensitivity/uncertainty (SUSD3D) codes are provided using both very detailed and simplified geometry models and different neutron source modelling. To facilitate the use of the experimental data for nuclear data validation and improvement, the SINBAD compilation includes also the sensitivity energy dependent profiles of the detector reaction rates with respect to the underlying cross-section data.

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Session Classification: P3