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New exclusive CHIPS-TPT algorithms for simulation of neutron-nuclear reactions

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The CHIPS-TPT physics library is being developed for simulation of neutron-nuclear reactions on the new exclusive level. The exclusive modeling conserves energy, momentum and quantum numbers in each neutron-nuclear interaction. The CHIPS-TPT algorithms are based on the exclusive CHIPS library, which is compatible with Geant4. Special CHIPS-TPT physics lists in the Geant4 format are provided, which help to use the CHIPS-TPT libraries in the Geant4 simulation. The calculation time for an exclusive CHIPS-TPT simulation is comparable to the time of the corresponding Geant4-HP simulation. In addition to the reduction of the deposited energy fluctuations, which is a consequence of the energy conservation, the CHIPS-TPT libraries provide a possibility of simulation of the secondary particles correlation, e.g. secondary gammas, and of the Doppler broadening of gamma lines in the spectrum, which can be measured by germanium detectors.

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