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Correlated Prompt Fission Data in Transport Simulations

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Recent advances in the modeling of the decay of fission fragments have led to the integration of fission event generators in transport simulations. Event-by-event generators follow the decay of each fragment through the successive emissions of neutrons and gamma rays. Natural correlations in energy, multiplicity, angle of those prompt particles with themselves and with their parent nucleus are ignored in simplified models of the post-scission process, and therefore in most transport simulation codes such as GEANT or MCNP. Integrating those generators into transport codes translates into much more realistic transport and detector response simulations. Neutron-neutron angular distributions, neutron-gamma multiplicity correlations and specific neutron-gamma-fragment correlations are of particular interest to provide answers to fundamental questions about the fission process, e.g., energy sharing at scission, as well as to improve simulations for specific applications, e.g., active interrogation of special nuclear material.

Through specific examples, I will discuss the meaning of these correlations in prompt fission data, and how they can help answer fundamental as well as applied physics questions. I will also provide an overview of the current experimental, theoretical and modeling efforts devoted to these studies.

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