

## Abstract

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Characterization of FS-3: a detection system for neutron-photon correlations in fission

We study the correlation in the neutron and gamma ray emission by fission fragments. We have designed and characterized in simulation a novel high-efficiency detection system, the Fission Sphere (FS-3). Specifically, we investigate the sensitivity of the detector system to neutron-photon correlations, energy-multiplicity, multiplicity-multiplicity, and angle-energy correlations. We have simulated the detection system using MCNPX-PoliMi, a Monte Carlo radiation transport code. To quantify the sensitivity to emission correlations, we choose two sources for the simulated particles. These include fission events created through a physics-based fission event generator – which will naturally have neutron-gamma ray correlations, and neutrons and gamma rays sampled from evaluated nuclear data – which are uncorrelated to each other. The result of these simulations show that the system has the capability of resolving some but not all of the predicted correlations in fission. Further work will be needed to increase the sensitivity of the system to the signatures of the fission process. In future work we will explore improving our data analysis techniques as well as adding additional detectors to the current design