

Abstract

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Event-by-Event Correlations of Total Photon Energy and Neutron Multiplicity in Spontaneous Fission of $^{252}\text{Cf}(\text{sf})$

Investigation of event-by-event correlations of total photon energy and neutron multiplicity offer details on neutron-photon emission that can be exploited to identify and characterize special nuclear material. In this work, we look at spontaneous fission data collected with the ChiNu array at the Los Alamos Neutron Science Center. The hemispherical array consisted of 45 17.78 cm in diameter by 5.08 cm thick cylindrical EJ-309 scintillators. The flight path is approximately 100 cm from each detector to the californium fission chamber at the center of the array. Organic scintillators have the capability of simultaneously measuring neutrons and photons. Furthermore, using pulse shape discrimination, we can distinguish between neutrons and photons on an event-by-event basis. We have investigated a dependence of total photon multiplicity on total neutron multiplicity and will now investigate the related correlations between total photon energy and total neutron multiplicity. We present preliminary results showing the measured total photon energy as a function of the measured event-by-event neutron multiplicity. In future work, we will unfold these results and determine the correlated neutron-photon emission.