Abstract Submitted
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A Signature Distinguishing Fissile From Non-Fissile Materials Using Linearly Polarized Gamma Rays[1] J.M. MUELLER, M.W. AHMED, H.J. KARWOWSKI, L.S. MYERS, M.H. SIKORA, Triangle Universities Nuclear Laboratory (TUNL), S. STAVE, Pacific Northwest National Laboratory, J.R. TOMPKINS, W.R. ZIMMERMAN, H.R. WELLER, TUNL — Photofission of ^{233,235,238}U, ^{239,240}Pu, and ^{232}Th was induced by nearly 100% linearly polarized, high intensity ($\sim 10^7$ γs per second), and nearly-monoenergetic γ-ray beams of energies between 5.6 and 7.3 MeV at the High Intensity γ-ray Source (HIγS). An array of 18 liquid scintillating detectors was used to measure prompt fission neutron angular distributions. The ratio of prompt fission neutron yields parallel to the plane of beam polarization to the yields perpendicular to this plane was measured as a function of beam and neutron energy, as described in a recent publication showing results from ^{235,238}U, ^{239}Pu, and ^{232}Th [1]. A ratio near unity was found for ^{233,235}U and ^{239}Pu while a significant ratio ($\sim$1.5-3) was found for ^{238}U, ^{240}Pu, and ^{232}Th. This large difference could be used to distinguish fissile isotopes (such as ^{233,235}U and ^{239}Pu) from non-fissile isotopes (such as ^{238}U, ^{240}Pu, and ^{232}Th). Polarization ratios as a function of the relative abundance of fissile to non-fissile isotopes will be presented.

[1] J. M. Mueller *et al.*, Phys. Rev. C 85, 014605 (2012).

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Jonathan Mueller
Triangle Universities Nuclear Laboratory (TUNL)

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