Abstract Submitted
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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, H.R. WELLER, W.R. ZIMMERMAN, Triangle Universities Nuclear Laboratory, J. RANDRUP, Lawrence Berkeley National Laboratory, R. VOGT, Lawrence Livermore National Laboratory — Photofission of ^{232}Th, ^{233,235,238}U, ^{237}Np, and ^{239,240}Pu was induced by nearly 100% linearly polarized, high intensity ($\sim 10^7$ γs per second), and nearly-monoenergetic γ-ray beams of energies between 5.3 and 7.6 MeV at the High Intensity γ-ray Source (HIγS). An array of 12-18 liquid scintillating detectors was used to measure prompt fission neutron yields. 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. A ratio near unity was found for ^{233,235}U, ^{237}Np, and ^{239}Pu while a significant ratio ($\sim$1.5-3) was found for ^{232}Th, ^{238}U, and ^{240}Pu. This large difference could be used to distinguish fissile isotopes (such as ^{233,235}U and ^{239}Pu) from non-fissile isotopes (such as ^{232}Th, ^{238}U, and ^{240}Pu). The measured ratios agree with the results of a fission calculation (FREYA) which used with previously measured photofission fragment angular distributions as input.

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