Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Measurement of Neutron-Induced, Angular-Momentum-Dependent Fission Probabilities Direct Reactions[1]

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— The surrogate method has previously been used to successfully measure (n, f) cross sections of a variety of difficult to produce actinide isotopes. These measurements are inaccurate at excitation energies below 1.5 MeV where the distribution of angular momentum states populated in the compound nucleus created by neutron absorption significantly differs from that arising from direct reactions. A method to measure the fission probability of individual angular momentum states arising from ^{239}Pu(d, pf) and ^{239}Pu$(\alpha, \alpha' f)$ reactions has been developed. This method consists on charged particle detectors with 40 keV FWHM resolution at 13 angles up and downstream of the beam. An array of photovoltaic (solar) cells is used to measure the angular distribution of fission fragments with high angular resolution. This distribution uniquely identifies the populated angular momentum states. These are fit to expected distributions to determine the contribution of each state. The charged particle and fission matrix obtained from these measurements determines fission probabilities of specific angular momentum states in the transition nucleus. Development of this scheme and first results will be discussed.

[1]This material is based upon work supported by the U.S. Department of Homeland Security under Grant Award Number 2012-DN-130-NF0001.

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Date submitted: 17 Dec 2014 Electronic form version 1.4