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Measurement of ^{240}Pu Angular Momentum Dependent Fission Probabilities Using the (α, α') Reaction JOHNATHON KOGLIN, Pennsylvania State Univ, JASON BURKE, SCOTT FISHER, Lawrence Livermore National Laboratory, IGOR JOVANOVIC, University of Michigan — The surrogate reaction method often lacks the theoretical framework and necessary experimental data to constrain models especially when rectifying differences between angular momentum state differences between the desired and surrogate reaction. In this work, dual arrays of silicon telescope particle identification detectors and photovoltaic (solar) cell fission fragment detectors have been used to measure the fission probability of the ^{240}Pu$(\alpha, \alpha' f)$ reaction - a surrogate for the ^{239}Pu(n, f) - and fission fragment angular distributions. Fission probability measurements were performed at a beam energy of 35.9(2) MeV at eleven scattering angles from 40° to 140°e in 10° intervals and at nuclear excitation energies up to 16 MeV. Fission fragment angular distributions were measured in six bins from 4.5 MeV to 8.0 MeV and fit to expected distributions dependent on the vibrational and rotational excitations at the saddle point. In this way, the contributions to the total fission probability from specific states of K angular momentum projection on the symmetry axis are extracted. A sizable data collection is presented to be considered when constraining microscopic cross section calculations.

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