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Investigating the kinematics of neutron-induced nuclear fission FRANK GONZALES, California Polytechnic State University San Luis Obispo — Nuclear fission is the process by which a radioactive heavy nucleus breaks apart into smaller fragments, releasing energy. When this process occurs spontaneously and two fragments emerge, conservation of momentum requires that they be emitted back-to-back. If the process is caused by a neutron colliding with the nucleus, the fragments will emerge with an opening angle less than 180 degrees. For this investigation we calculated the opening angle of two fragments from the fission of major actinides caused by collisions with neutrons of energies in the range of 0.1 to 100 MeV in both a semi-classical and fully relativistic framework. In the former case, the energy liberated by the fission process, the Q-value of the reaction, is obtained from the semi-empirical mass formula for the particles involved. We find that the opening angles decrease by a few degrees relative to the back-to-back baseline over the range of neutron energies considered in both cases. These results will help us improve the tracking and pointing resolution of the NIFFTE time projection chamber.

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