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Energy dependence of fission yields investigated using quasi-free (p,2p) scattering reactions on 238U in inverse kinematics

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In the last decade, unprecedented fission experiments have been carried out at the GSI/FAIR facility using the inverse kinematics technique in combination with state-of-the-art detectors. For the first time in the long-standing history of fission, it was possible to simultaneously measure and identify both fission fragments in mass and atomic numbers [1] and obtain many correlations among them sensitive to the fission process dynamics and the nuclear structure at the scission point [2, 3]. To go a step further in the fission characterization, our goal is to study the fission yield dependence on the excitation energy of the compound nucleus, which is relevant for the fission fragment treatment in stellar nucleosynthesis r-process calculations [4,5]. In order to get access to this key observable, we carried out the first quasi-free (p,2p)-fission experiment on ^{238}U at GSI/FAIR in 2021. The quasi-free (p,2p) scattering collisions induce fission through particle-hole excitations that can range from few to ten's of MeV, and the excitation energy can be obtained by the measurement of the two outgoing protons. In this talk we will present first results on the yields of fragments produced in quasi-free proton scattering on 238U at 560A MeV. These yields will be compared to state-of-the-art model calculations to derive the excitation energy of the fissioning systems.

References:
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