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Dynamics of Fission Pathways

While the importance of nuclear fission as a many-body decay process is well-established, a full understanding of the myriad pathways explored by fissioning systems has remained elusive. Each of these pathways explored by the compound nuclei can result in vast differences in the fission products and directly influences the charge, masses, energies, and angular momenta of the outgoing fragments. In this talk we discuss both a constrained Hartree-Fock-Bogoliubov approach to exploring the (potentially many) discrete pathways through multidimensional collective spaces [1] as well as a real-time approach to exploring asymmetric fission channels via time-dependent density functional theory [2]. Through these complementary approaches we explore briefly the impact on fission lifetimes and fragment production, discuss potential next steps for the study of fission pathways, and attempt to obtain a deeper insight into the complex many-body dynamics of nuclear fission.

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2. C. Simenel, P. McGlynn, A.S. Umar, and K. Godbey, Phys. Lett. B 822, 136648 (2021).

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