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Fission dynamics within time-dependent density functional theory SHI JIN, AUREL BULGAC, University of Washington, KENNETH ROCHE, Pacific Northwestern National Laboratory, NICOLAS SCHUNCK, Lawrence Livermore National Laboratory, IONEL STETCU, Los Alamos National Laboratory
— We present results for the low energy induced fission of 240Pu within the time-dependent density functional theory (TDDFT) extended to superfluid phenomena, using two nuclear energy density functionals, SeaLL1 and SkM*. We conclude the pairing correlation play a crucial role and during the saddle-to-scission the dynamics is strongly overdamped, due to the one-body dissipation mechanism. Scission is organically incorporated into the formalism and the properties of the emerging fission fragments are controlled by shell effects and pairing correlations. The heavy fragment emerges close to spherical and cooler than the light fragment, which is highly deformed and reaches eventually a higher temperature. We extract the average mass and charge values, the kinetic and the excitation energies of the fission fragments, and the properties of the emitted neutrons during scission and during the initial acceleration of the fission fragments. All evaluated properties are in good agreement with observations.

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