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The Theoretical Description of Nuclear Fission

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Fission is a fundamental nuclear decay that plays an important role in many areas of science. Recently, significant progress has been made in the microscopic modeling of the dynamics of spontaneous and induced fission based on nuclear density functional theory (DFT) [1]. The nuclear fission process is a dramatic example of large-amplitude collective motion in which the nucleus undergoes a series of shape changes before splitting into distinct fragments. Because of the complexity of this process, our understanding is still not complete. The simulation of independent and cumulative yields requires knowledge of the initial conditions of the fragments immediately after scission. We take a closer look at the microscopic description of nuclear fission within the framework of nuclear density functional theory, combining the multidimensional minimization of the collective action for fission with a statistical approach rooted in a microcanonical ensemble to track the relevant fission paths from the ground-state configuration up to scission [2, 3, 4].

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