

Fission fragments present a messy but unique source of experimental data about the many-body physics of neutron-rich nuclei, which has implications in r-process nucleosynthesis, energy, and national security applications. Currently, predictive interactions for nuclear reaction models are fit to scattering experiments on stable targets, and extrapolated far from stability for applications involving neutron-rich nuclei; including in fission event generators that use Hauser-Feshbach fragment de-excitation, such as CGMF, FIFRELIN, GEF, and Meitner. The goal of this work is to constrain this extrapolation by directly fitting a phenomenological form of the self-energy (encapsulating the shell model for structure and optical model for reactions) to experimental measurements of correlated fission observables. Additionally, this work aims to improve the predictive capability of CGMF, as a part of a project to globally optimize model parameters to a variety of orthogonal fission observables. In this talk, I present an uncertainty quantification for a corpus of fission observables in CGMF, due to phenomenological and theoretical uncertainty in three different optical models, with results positively indicating the efficacy of the proposed fitting. Additionally, I demonstrate initial results for a reduced-basis emulator for nuclear scattering, being developed for inclusion in CGMF, to make the proposed fitting computationally tractable.