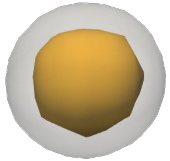
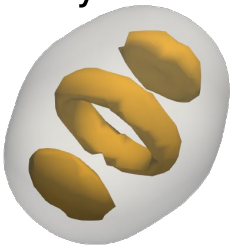
Time-Dependent Approaches to Nuclear Dynamics

Key benefits include the treatment of structure and dynamics on the same footing, the natural inclusion of all dynamical effects, and the flexibility to systematically study many reaction channels.

Processes such as fusion are vital to understand across the chart of nuclides and are also very sensitive to phenomena like transfer and collective excitations during the reaction.

Similarly important are the properties of fission, where information such as fission barriers, lifetimes, and fragment distributions are frequently studied in isolation despite their being inextricably linked.





What is required for progress?

Theoretically

Further development and extensions to predictive, microscopic approaches such as TDDFT, TDGCM, TDCC, t-VMC, etc

Develop statistical framework for end-to-end, fully quantified uncertainties

Computationally

Continued investment in traditional HPC efforts

Foster collaboration with applied mathematicians and industry experts in ML to accelerate emulator development for UQ

Same story for development of novel QC algorithms

Experimentally

Investigate near-barrier fusion-fission reactions with neutron-rich nuclei

Study the quasifission reaction as a surrogate for fission