



Contribution ID: 15

Type: 4th week (Nuclear matter under extreme conditions)

## First principles calculations of atomic nuclei for constraining the nuclear equation of state and neutron star properties

*Friday, November 8, 2024 11:00 AM (30 minutes)*

Breakthroughs in our treatment of nuclear forces constrained by QCD, the many-body problem, and AI/machine learning techniques are transforming modern nuclear theory into a true first-principles discipline. This allows us to now address some of the most exciting questions at the frontiers of nuclear structure, searches for physics beyond the standard model, and connections to nuclear astrophysics

In this talk I will briefly outline our many-body approach, the valence-space in-medium similarity renormalization group, and how recent advances have enabled breakthrough globally converged calculations of open-shell nuclei to the 208Pb region and beyond. In particular, I will discuss how the neutron skin and dipole polarizability in 208Pb correlate with and constrain the slope of the symmetry energy in the nuclear equation of state to pin down neutron star properties. In addition I will explore the possibility to further refine constraints from mirror charge radii differences as well as dipole quadrupole polarizabilities for constraining tidal deformabilities.

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