

Nuclear charge radii from the partial pinhole algorithm

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Nuclear charge radii are among the most fundamental properties of atomic nuclei. In nuclear lattice effective field theory, charge radii are typically calculated using the pinhole method, where an A -body density operator (A being the mass number) is inserted at mid-time during the imaginary time evolution. However, this A -body density operator introduces significant sign oscillations, especially for heavy nuclei and large imaginary times. In this talk, I will present a novel approach called the partial pinhole method for calculating nuclear charge radii. By reducing the order of the density operators, this method significantly alleviates the sign oscillation issue. This method is then combined with the recently developed wavefunction matching technique, and the charge radii of oxygen isotopes are well reproduced using high-fidelity chiral effective field theory interactions.

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