

Lattice simulation of nucleon distribution and shell closure in ^{22}Si

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In this report, we focus on ^{22}Si , likely the lightest bound nucleus with $T_z=-3$, using Nuclear Lattice Effective Field Theory (NLEFT) with chiral forces. Our calculations agree with existing data and predict it as a proton-dripline nucleus, along with its $2+$ state, radius, and spatial properties. Using nucleon ordering operators, we reveal nucleon spatial arrangement and localization, linked to shell closure features. Moreover, we introduce a novel pinhole method bridging NLEFT and shell model, offering new perspectives into a more comprehensive understanding of nuclear structure.

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