Abstract Submitted
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The Gamow Shell Model as a tool for ab-initio nuclear structure calculations[1] GEORGE PAPADIMITRIOU, BRUCE BARRETT, Department of Physics, University of Arizona, JIMMY ROTUREAU, Chalmers University of Technology, MAREK PLOSZAJCZAK, Grand Accelerateur d Ions Lourds — No core Gamow shell model (NCGSM) is applied for the first time to study selected well-bound and unbound states of helium isotopes. This model, formulated in the rigged Hilbert space and using a complete Berggren ensemble, is appropriate for a description of bound states, resonances, and the many-body scattering states. The "dimensional catastrophe" in NCGSM when increasing the number of active particles is much more serious than in the No Core Shell Model (NCSM). This problem has been alleviated by the application of the Density Matrix Renormalization Group (DMRG) method, opening a possibility for the *ab initio* calculation of exotic states in hydrogen, helium and lithium chains of isotopes. The *ab initio* NCGSM calculations start from either bare interaction or various renormalized two-body interactions such as Vlow-k. The single-particle Berggren ensemble consisting of bound, resonance and non-resonant continuum states is generated by the corresponding Gamow-Hartree-Fock potential. To test the validity of our approach, we benchmarked the NCGSM results against Fadeev and Fadeev-Yakubovsky exact calculations for ^{3}H and ^{4}He nuclei. We also performed *ab-initio* NCGSM calculations for the unstable nucleus ^{5}He and determined the ground state energy and decay width, starting from a realistic N^{3}LO interaction.

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