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Ab-initio calculation of nuclear structure with many-body perturbation theory

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Starting from realistic nuclear forces (N3LO [1] and JISP16 [2]), we perform the Hartree-Fock approximation first. Taking the HF solution as the reference and using many-body perturbation theory (MBPT) [3], we make corrections to the HF calculation, up to the third-order correction in nuclear energy and up to the second order in nuclear radius. As preliminary calculations, we have investigated the closed-shell nuclei, 4He and 16O, obtaining quite good results in both binding energies and radii. Further work is in process.

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References:
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