Nuclear matter in relativistic Brueckner-Hartree-Fock theory with Bonn potential in the full Dirac space

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Purpose   Study the properties of symmetric nuclear matter with the relativistic Brueckner-Hartree-Fock (RBHF) theory in the full Dirac space.

Outline   The RBHF calculations in the full Dirac space are performed with the Bonn potential. The uncertainties of the RBHF calculations in the Dirac space with positive-energy states only are analyzed. The significance of the RBHF calculations in the full Dirac space are demonstrated.

Result   Our results reproduce the empirical saturation properties of nuclear matter, and agree with the results based on the relativistic Green's function approach (Huber(1995)), which clarifies the disparities of the RBHF calculations in the full Dirac space.

WSB, Q. Zhao, P. Ring and J. Meng, arXiv:2103.12960 (2021)

Computing system: OCTOPUS
node-hour: 6.3 octopus point
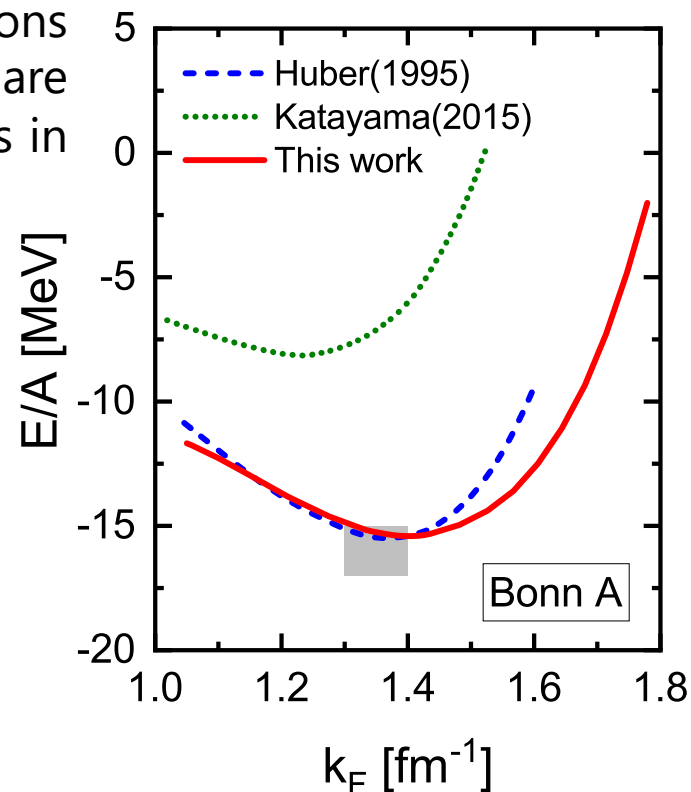memory used: 0.9 GB
parallelize: 1 node

Figure. The equation of state for nuclear matter calculated with the RBHF theory in the full Dirac space.