

Pauli blocking in the pion gas - a lesson for compact star physics

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Collaboration

Abstract content

We show that the Φ -derivable formulation of the cluster virial expansion for quark-hadron matter contains the quark Pauli blocking effect in the lowest order expansion with respect to the backreaction of hadrons on the quark dynamics.

We discuss two examples for the application of the approach. First the quark Pauli blocking in the pion gas is shown to explain the repulsive $I = 2$ phase shift near threshold and its almost perfect cancellation with the attractive $I = 0$ channel. Second, the quark Pauli blocking in nuclear matter is shown to be in good agreement with repulsive, density-dependent interactions in density functionals of the Skyrme type. The relationship to modern excluded volume approaches to nuclear and neutron star matter at supersaturation densities is demonstrated and consequences for compact star phenomenology are discussed.

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