

Nucleon mean-free path in the medium

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We provide first-principle calculations of the nucleon mean-free path in the medium by extending the many-body Green's functions formalism to the complex energy domain. Using self-consistent ladder self-energies, we find the spectra and lifetimes of quasi-particles in nuclear and neutron matter. With a consistent choice of the group velocity, the nucleon mean-free path can be computed. Our results indicate that, for energies above 50 MeV at densities close to saturation, a nucleon has a mean-free path of 4 to 5 femtometers. This paves the way toward an ab initio description of transport properties of dense matter.

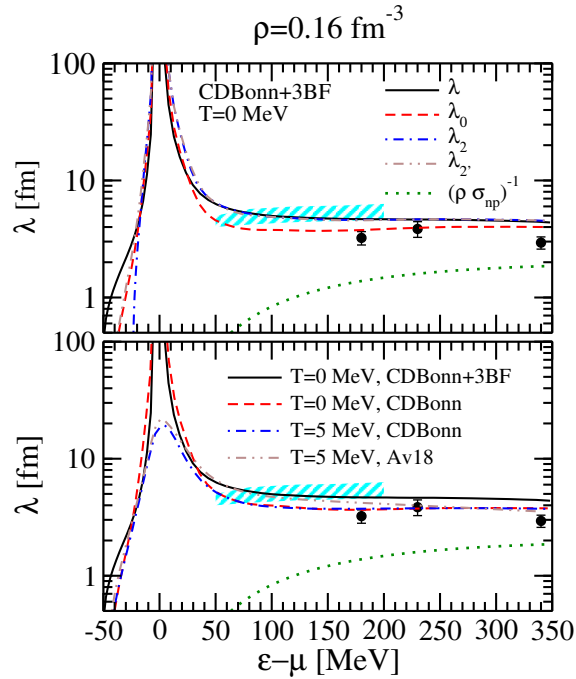


Figure 1: Mean-free path of a nucleon in nuclear matter as a function of energy. Upper panel: results obtained with a CDBonn+3BF self-energy at $T = 0$ MeV for different approximation schemes. Lower panel: mean-free path from the fully dressed pole for different NN forces and two different temperatures.