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Unpolarized Fermi gas in squeezed anisotropic harmonic trap by Quantum Monte Carlo methods XIN LI, LUBOS MITAS, Physics Department, North Carolina State University — Using diffusion Monte Carlo (DMC) method, we calculate the ground state properties of unpolarized Fermi gas at unitarity regime in both isotropic and anisotropic harmonic potentials. We study the effects of anisotropy by increasing the frequency in z direction ω_z of the harmonic potential while keeping the frequency in x and y direction unchanged. The true unitarity regime is obtained by extrapolating the interaction range to zero and the calculations are done using the fixed-node diffusion Monte Carlo method. The trial function is of the BCS form with the pairing function expanded in appropriate linear combinations of the anisotropic oscillator eigenstates. We evaluate the binding energies for varying particle numbers and we estimate its behavior in the limit of large number of atoms. We estimate dependence of projected density profile and momentum distribution on the X-Y plane with respect to ω_z. Our results can be readily used as a benchmark for the cold atom experiment with similar experimental set-up. Supported by ARO and NSF.

Xin Li
Physics Department, North Carolina State University

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