

Dimensionality and Finite Number Effect on BCS Transition of Atomic Fermi Gas

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Abstract: The effect of finite number and dimensionality has been discussed in this paper. The finite number effect has a negative correction to final temperature for 2D or 3D atomic Fermi gases. The changing of final temperature obtained by scanning from BEC region to BCS region are 10% or so with $N \leq 10^3$ and can be negligible when $N > 10^3$. However, in 1D atomic Fermi gas, the effect gives a positive correction which greatly changes the final temperature in Fermi gas. This behavior is completely opposed to the 2D and 3D cases and a proper explanation is still to be found. Dimensionality also has a positive correction, in which the more tightly trapping, the higher final temperature one gets with the same particle number. A discussion is also presented.

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Key words: finite number effect, dimensionality, atomic BCS transition

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