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Progress in FRG for 1D nuclear matter

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The Density functional theory (DFT) is a microscopic method to get the ground-state energy of quantum many-body systems.
Due to the low numerical cost, it is widely applicable to nuclear, atomic and molecule physics.

In the DFT, the Hohenberg-Kohn theorem ensures that energy can be expressed as a functional of density, so-called "energy density functional (EDF)"and the EDF is uniquely determined. However, the theorem does not provide how to construct the EDF.

Recently, the functional renormalization group (FRG) in the quantum field theory helps to construct the EDF[1,2]. This idea is applied to the 1D nucleon system[3] and the 2D electron system[4], where these results are similar to those of Monte Carlo.
In order to apply to the inhomogeneous systems, we propose a new method with the flow equation for the density.
In this talk, we will report the comparison between this new method and the previous one in 1D homogeneous nucleon system.

References

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