For favour of Posting

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

Projected Sobolev gradient flows for computing ground state of ultracold dipolar fermi gas

By

Prof. Hanquan WANG

Yunnan University of Finance and Economics

Abstract

The ground state for the ultracold fermi gas with dipole-dipole interaction is a functional minimization problem based on density functional theory (DFT). We extend the recent work on Sobolev gradient flow for the Gross-Pitaevskii eigenvalue problem, and present continuous projected Sobolev gradient flows for computing the DFT-based ground state solution of ultracold dipolar fermi gas. We prove that the gradient flows have the properties of orthonormal preserving and energy diminishing, which is desirable for the computation of the ground state solution. Many numerical technique for partial differential equation can be used to discretize the time-dependant projected Sobolev gradient flows, which may be an advantage of the method. We propose an efficient and accurate numerical scheme – semi-implicit Euler method in time and Fourier spectral method in space for discretizing these projected Sobolev gradient flows and use them to find the ground states of the fermi gas numerically. Extensive numerical examples in three dimensions for ground states are reported to demonstrate the power of the numerical methods.

Date : 07 August 2024 (Wednesday)
Time : 10:00a.m.-11:00a.m.
Venue : Room 4503 (Lift 25/26)

All are Welcome!