



Department of Mathematics
The Chinese University of Hong Kong

For Favour of Posting

數學系
香港中文大學

Phone: (852) 3943 7988-9 • Fax: (852) 2603 5154 • Email: dept@math.cuhk.edu.hk
Rm. 220, Lady Shaw Building, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

Kinetic Day

Talk 1 (9:30-10:30):

Ghost effect from Boltzmann theory *Professor Lei WU (Lehigh University)*

Abstract: The hydrodynamic limit aims to derive fluid equations (such as the Euler and Navier-Stokes equations) from kinetic theory (such as the Boltzmann and Landau equations) in a rigorous manner. This is a key ingredient for addressing the Hilbert sixth problem. As the Knudsen number (which measures mean free path) approaches zero, almost all standard fluid equations can be derived through proper scaling. Our work presents an unusual hydrodynamic limit that shows genuine kinetic effects, known as the ghost effect. The density and temperature of order ϵ are coupled with the velocity of order $\sqrt{\epsilon}$ which acts like a "ghost" that can't be observed at the fluid level. This suggests that standard fluid mechanics is incomplete in describing many-particle systems even at the continuum regime. This is joint work with Raffaele Esposito, Yan Guo and Rossana Marra, and is mainly based on preprints <https://arxiv.org/abs/2301.09427> and <https://arxiv.org/abs/2301.09560>.

Talk 2 (10:40-11:40):

Continuum limit for discrete NLS *Dr. Zhimeng Ouyang (The University of Chicago)*

Abstract: In this talk, I will discuss recent results on the continuum limit of some differential-difference equations. Using the Ablowitz-Ladik system, an integrable discretization of the nonlinear Schrodinger equation, as our prototypical example, we show that solutions to the discrete model converge to solutions of the cubic NLS for merely L^2 initial data. Furthermore, we consider initial data for this lattice model that excites Fourier modes near both critical points of the discrete dispersion relation and demonstrate convergence to a decoupled system of NLS. We achieve this through a new scheme that synthesizes compactness and Strichartz-based techniques. The idea of almost conservation laws will then be introduced to complete the proof of other non-integrable lattice approximations to NLS.

Date :	May 25, 2023 (Thursday)
Time :	9:30am – 11:40am (Hong Kong SAR)
Venue:	Lai Chan Pui Ngong LT (LPN_LT), Y.C. Liang Hall, The Chinese University of Hong Kong, Shatin

All are Welcome