



DEPARTMENT OF APPLIED MATHEMATICS

應 用 數 學 系

**The Hong Kong Polytechnic University
Department of Applied Mathematics**

Colloquium

**The Cauchy problem and BEC stability for the quantum Boltzmann-
Condensation System at very low temperature**

by

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Abstract

After a short review of classical kinetic collisional theory from a probabilistic viewpoint, we discuss a new model for a coupled quantum Boltzmann-Condensation system that describes the evolution of the interaction between a well formed Bose-Einstein Condensate (BEC) and the quasi-particles cloud. The kinetic part of the model, derived as weak turbulence kinetic model from a quantum Hamiltonian, is valid for a dilute regime at which the temperature of a bosonic gas is very low compared to the Bose-Einstein condensation critical temperature. In particular, the system couples the density of the condensate from a Gross-Pitaevskii type equation to the kinetic equation through the dispersion relation in the kinetic model and the corresponding transition probability rate from pre to post collision momentum states.

We show the well-posedness of the Cauchy problem to the system, find qualitative properties of the solution such as instantaneous creation of exponential tails, and prove the condensate uniform stability related to the initial mass ratio between condensed particles and quasi-particles. This stability result leads to global in time existence of bounded, finite energy solutions to an initial value problem for the quantum Boltzmann-Condensation system.

Date : 26 September, 2018 (Wednesday)

Time : 11:00a.m. – 12:00noon

Venue : TU801, The Hong Kong Polytechnic University

***** ALL ARE WELCOME *****