# The Hong Kong Polytechnic University
# Department of Applied Mathematics

## Seminar

## On

# Portfolio Credit Modelling by Particle Systems and SPDEs

## by

## Dr. Lei Jin

### Abstract

We consider a dynamic credit model within the structural model framework for a large portfolio of credit risky assets. We model the asset values as a particle system with an absorbing boundary, where the correlation is due to a market factor. By considering the large portfolio limit of this system we study the evolution of its limit empirical measure and show the existence of the density process. This density evolves according to a stochastic partial differential equation, and we establish existence and uniqueness for the solution taking values in a suitable function space. Through the solution to the SPDE we obtain an explicit formula for the limit default proportion - a crucial factor in multi-name credit derivatives' pricing - at any time. Furthermore, we illustrate the ability of the model in its simplest setting by calibrating to credit indices and considering its performance before and after the credit crunch. This is a joint work with Prof. Ben Hambly at the University of Oxford.

### Short bio

Dr. Lei Jin received her Ph.D. in Mathematical Finance and Stochastic Analysis from the University of Oxford in 2010 and Ph.D. in Probability and Mathematical Statistics from the Chinese Academy of Sciences in 2011. She worked as a non-stipendiary lecturer at St Anne's College, University of Oxford from 2009-2010. After graduation she worked with Goldman Sachs in London and New York as a quantitative strategist in Algorithmic Rates Trading Group. Her research interests lie in mathematical finance and stochastic analysis including credit derivatives modeling and pricing, particle system and stochastic partial differential equation. She publishes in SIAM Journal on Financial Mathematics and has presented at Bachelier Finance World Congress.

**Date : January 13, 2012 (Friday)**

**Time : 2:30 p.m. – 3:30 p.m.**

**Venue : HJ610, The Hong Kong Polytechnic University**

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