PHYSICAL MATHEMATICS SEMINAR

DYNAMIC SCALING IN SMOLUCHOWSKI'S COAGULATION EQUATIONS

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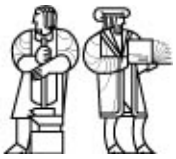
ABSTRACT:

Smoluchowski's coagulation equations are a fundamental mean-field model of coalescence. These equations were originally derived to study the coagulation of colloids, but the notion of clustering arises in many different fields, and they have since been used in diverse areas (e.g. formation of smoke, dust and haze, kinetics of ploymerization, growth of islands on thin films, animal and fish population dynamics...).

A typical feature of these systems is "dynamic scaling" -- or the emergence of self-similar distributions as mass is transported from small to large scales by coalescence. I will describe joint work with Bob Pego that pins this down rigorously. A general theme is the fundamental utility of classical ideas in probability (stable laws, limit theorems, infinite divisibility) for such "scaling" dynamical systems. I will also describe a striking connection with Burgers turbulence (i.e. the structure of solutions to Burgers equation with random initial data) discovered by Jean Bertoin, and an interesting "universality theorem" for such solutions.

TUESDAY, APRIL 5, 2005
2:30 PM
Building 2, Room 338

Refreshments at 3:30 PM in Building 2, Room 349.



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