



Theoretical Statistics and Mathematics Unit

Indian Statistical Institute

203 B.T. Road, Kolkata - 700108

SEMINAR

Date: July 28, 2026

Time: 4:15 PM

VENUE:

L-Infinity, 5th Floor, A.N. Kolmogorov Bhavan, ISI Kolkata

SPEAKER:

Rounak Roy

Brown University, USA

TITLE:

Sufficiency condition for well-posedness of Interacting particle systems on infinite graphs

ABSTRACT:

Interacting particle systems on large sparse networks are expected to be governed by the local geometry of the network. Through local weak convergence, the empirical measure of the dynamics converges to the law of the root of a limiting, typically infinite, rooted graph—provided the dynamics on that limit is well-posed. Unlike the finite setting, well-posedness can fail on infinite graphs, where influence may propagate across unboundedly many vertices in bounded time. Ganguly and Ramanan identified a sufficient geometric condition that rules this out: the limit graph should be finitely dissociable, a degree-dependent, percolation-type property of the graph alone.

We study which infinite graphs are finitely dissociable. We give a sufficient criterion for branching processes with a general type space, and use it to show that finite-type Galton–Watson trees, the Pólya point tree (the local limit of preferential attachment models), and a class of random connection models on $\mathbb{R}^d$ are finitely dissociable. Consequently, the hydrodynamic limit is well-posed for the canonical sparse random graph models. Conversely, we prove that branching processes with infinite branching number are not finitely dissociable, marking the boundary of the theory and motivating the conjecture that well-posedness itself fails there.

Joint work with Prof. Kavita Ramanan.

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