



Theoretical Statistics and Mathematics Unit

Indian Statistical Institute

203 B.T. Road, Kolkata - 700108

SEMINAR

Date: July 10, 2026

Time: 04:15 PM

VENUE:

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

SPEAKER:

Arpan Mukhopadhyay

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TITLE:

Phase Transition in the 2-Choices Opinion Dynamics under Stochastic Node Failures

ABSTRACT:

The 2-Choices rule is a well-studied distributed consensus protocol in which nodes, each holding a binary opinion, rapidly converge to the opinion initially supported by the majority. Under the classic version of this rule, nodes update their opinions at the ticks of independent Poisson clocks by sampling two neighbours uniformly at random and adopting the majority opinion among themselves and the sampled neighbours. In this talk, I shall explore a slightly modified version of the 2-Choices dynamics in the presence of node failures. Specifically, each node independently fails to follow the update rule with constant probability α ; upon failure, it instead selects one of the two opinions uniformly at random. This constitutes a strong failure model, generating $\Theta(n)$ failures per unit time on average. Surprisingly, we show that the system remains robust: for failure probabilities below a critical threshold, the dynamics resemble the classical (failure-free) 2-Choices process. However, once the failure probability exceeds this threshold, the system loses robustness and rapidly mixes to a stationary distribution. Our results apply to both complete graphs and to expander graphs with sufficiently large spectral gaps and sufficiently homogeneous degree distributions. This talk is based on [work](#) that has appeared at SIGMETRICS 2026 and is joint with Luke Meredith (Warwick).

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