

**ICTS**

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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS CALIBRE Seminar

Title : Leveraging Twin Information for Inference of Gene Regulatory Networks.

Speaker : Keerthana M Arun (University of Pennsylvania, USA)

Date : Thursday , 20 August 2026

Time : 2:00 PM (IST)

Abstract : Gene regulatory networks (GRNs) underlie maintenance of cellular phenotypes and responses to stimuli. Modern single-cell profiling methods offer high-throughput datasets to infer GRNs en masse but do not capture dynamic information. Cell-state heterogeneity further confounds correlation-based inference approaches. We addressed these challenges with TwINFER, a conceptual framework leveraging information from recently divided sister cells, or “twins,” identifiable via recently developed barcoding techniques. We show that twin information discriminates regulatory from non-regulatory correlations and resolves interaction direction and type (activation/repression). We performed a diverse set of simulations, covering common network motifs and large-scale networks, where TwINFER outperforms state-of-the-art inference capabilities. Crucially, TwINFER resolved the commonly observed false positives in fan-out and feed-forward loop motifs where most methods perform poorly. Lastly, we applied TwINFER to a lineage-barcoded hematopoiesis dataset, which refined the network inference, flagged multi-state genes, and determined causal relations. Our work exploits cellular twins as untapped information, readily complementing existing inference approaches.

Venue : Madhava Lecture Hall

Zoom Meeting:

<https://icts-res-in.zoom.us/j/91880539967?pwd=e8ZQMtdNfskXfJOEjMl4Kj1dJKS22.1>

Meeting ID: 918 8053 9967

Passcode: 397962