



## Seminar, Department of Physical Sciences, Bose Institute, Kolkata

### Performing High-Dimensional Statistical Inference with Artificial Intelligence in Particle and Astrophysics

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**Abstract:** Statistical inference is a crucial step in gleaning insights from experimental/observational data to build better physics models to describe our universe. Whether it is to unravel the mysteries of the interior of neutron stars, or to uncover the secrets about virtual Higgs bosons, precise inference requires a careful consideration of all sources of systemic uncertainties. Did we discover a new particle, or did we just discover a miscalibration of the detector? Such complex data analysis has traditionally involved multiple stages of lossy dimensionality reduction and simplifying assumptions in order to make the final inference feasible. This talk brings together Bayesians and frequentists in our quest for high-dimensional statistical inference to maximally leverage the collected data as well as prior physics knowledge, to perform near-optimal and uncertainty-aware parameter inference. I will talk about a use case in Bayesian inference for neutron star astrophysics as well as a frequentist case for measuring the Higgs width, where we see a dramatic improvement in precision and interpretability with machine learning.

Date/time: June 07, 2024 (Friday) at 03:00 PM

Venue: Physics Seminar Room (204, second floor, UAC, BI)