DEARBORN | MATHEMATICS & STATISTICS
UNIVERSITY OF MICHIGAN-DEARBORN

Colloquium

MONDAY, OCT 12, 2026

3:30 PM - 4:30 PM | 2048 CB

TRUSTWORTHY SCIENTIFIC INFERENCE WITH INTRACTABLE LIKELIHOODS

Speaker: James Carzon

Bio

James is a UM-D alumnae and a current Statistics and Data Science PhD student at Carnegie Mellon University. His work focuses on likelihood-free inference (LFI) for physical sciences like astrophysics, high-energy physics, and environmental science. Using modern machine learning, they recover hidden parameters from complex simulators while ensuring reliable, trustworthy scientific inference.

Abstract

Science is often concerned with inferring the hidden properties of physical systems. Over the course of many decades, different traditions of inference have developed between scientific fields of study to take advantage of the unique structures of those underlying systems and the data that they generate. Recently, with the advent of mathematically intractable computer codes and the emergence of large-scale survey studies, these traditional approaches have failed to scale to massive data set sizes and new modeling complexities. This is the so-called likelihood-free inference (LFI) setting, where the likelihood function is intractable but implicitly encoded by a simulator or in observations of Nature itself. An open question in this setting is how to best construct confidence sets with high constraining power, finite sample size coverage guarantees, and robustness to various model misspecifications. In this talk, I present a framework which equips scientists to construct confidence sets which satisfy these conditions while taking advantage of their preferred choice of machine learning (ML) or artificial intelligence (AI) tools. I will then showcase the framework's success in addressing real scientific challenges that arise across the physical sciences.

Refreshments will be provided!