Indiana University Indianapolis
Department of Mathematical Sciences

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, March 04, 2025
Zoom Meeting: Meeting ID: 845 0989 4694

Speaker: Jing Liu
Department of Physics and Astronomy, Purdue University

Title: Deciphering gene expression in single cells with single molecule imaging and math-modeling

Abstract:

Recently emerged spatial transcriptomics approaches combine the RNA sequencing (RNA-Seq) with spatial localization to reveal the spatial heterogeneity of transcriptome at the single molecule resolution. However, the interrogation of the transcriptomic expression in a single cell is missing. In this talk, I will mainly introduce the recent effort in my lab focusing on the single molecular interrogation of the gene expression. First, I will describe a quantitative approach to quantify the spatial distribution of RNA molecules in a single cell, and will give a case study to investigate the RNA expression in single β cells obtained from human pancreatic tissues. Following that, I will briefly discuss the establishment of a two-state math model to study the transcriptional kinetics, and will talk about two on-going case studies that investigate the transcriptional kinetics in (1) human cells and (2) plant system.

Bio:
Dr. Jing Liu is an Associate Professor in the Department of Physics and Astronomy at Purdue University. He is also affiliated with the Indiana University School of Medicine as members in the Simons Comprehensive Cancer Center, Center for Diabetes and Metabolic Diseases, and Center for Computational Biology and Bioinformatics. Prior to his appointment at Purdue, Dr. Liu was a tenure-track faculty at Indiana University-Purdue University Indianapolis and South Dakota School of Mines and Technology. His group currently focuses on the utilization of theoretical and experimental physical sciences to quantitatively interpret the complexity and dynamics of molecules in a single cell, with strong interests in facilitating the diagnosis, treatment, and prevention of cancers, diabetes, and Alzheimer's Disease.