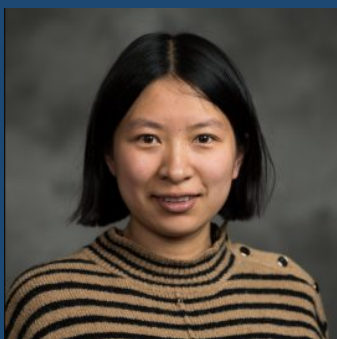


# Department of Applied and Computational Mathematics and Statistics Colloquium



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## *Astronomical instrument calibration with mean-variance coupled models*

In this talk, I will cover published and recent work on astronomical instrument calibration with multiplicative shrinkage models. Calibration data are often obtained by observing several well-understood objects simultaneously with multiple instruments, such as satellites for measuring astronomical sources. Analyzing such data and obtaining proper concordance among the instruments is challenging when the physical source models are not well understood, when there are uncertainties in known physical quantities, or when data quality varies in ways that cannot be fully quantified. Furthermore, the number of model parameters increases with both the number of instruments and the number of sources. Thus, concordance of the instruments requires careful modeling of the mean signals, the intrinsic source differences, and measurement errors. We propose a log-Normal model and a more general log- $t$  model that respect the multiplicative nature of the mean signals via a half-variance adjustment, yet permit imperfections in the mean modeling to be absorbed by residual variances. We demonstrate that our method provides helpful and practical guidance for astrophysicists when adjusting for disagreements among instruments. Extensions of the model to account for heterogeneity of noise levels and systematic correlation across instruments will be discussed if time permits.

Zoom Link:

<https://notredame.zoom.us/j/94492555966?pwd=NndEY3pwelhNQmxxaEV5bUNLQ0VQdz09>

Meeting ID: 944 9255 5966

Passcode: 563039

