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*Spectrum-Aware Debiasing: Inference beyond sub-Gaussian Covariates  
with Applications to Principal Component Regression*



**Wednesday, May 1st, 2024**

**11:50 AM**

**96 Frelinghuysen Road, CoRE Building, Room 431**

**Zoom Meeting: Meeting ID: 969 0606 4706**

**Password: 745339**

<https://rutgers.zoom.us/j/96906064706?pwd=ZklvbExpRVBJQ3c5dUhhYTFuR2ZrZz09>

**Light refreshments will be served in Hill 452, 11:15am**

**Abstract:** Debiasing methodologies have emerged as a powerful tool for statistical inference in high dimensions. Since its original introduction, the methodology witnessed a major advancement with the introduction of degrees-of-freedom debiasing in Bellec and Zhang (2019). While overcoming limitations of initial debiasing approaches, this updated method suffered a limitation—it relied on sub-Gaussian tails and independent, identically distributed samples. In this talk, we propose a novel debiasing formula that breaks this barrier by exploiting the spectrum of the sample covariance matrix. Our formula applies to a broader class of designs known as right rotationally invariant designs, which include some heavy-tailed distributions, as well as certain dependent data settings. Our correction term differs significantly from prior work but recovers the Gaussian-based formula as a special case. Notably, our approach does not require estimating the high-dimensional population covariance matrix yet can account for dependence among features and samples. We demonstrate the utility of our method for several statistical inference problems. As a by-product, our work also introduces the first debiased principal component regression estimator with formal guarantees in high dimensions. This is based on joint work with Yufan Li.

**Bio:** Pragya Sur is an Assistant Professor of Statistics at Harvard University, where she works on high-dimensional problems in statistics and machine learning. Her research is supported by an NSF DMS Award, the Eric and Wendy Schmidt Fund for Strategic Innovation, a William F. Milton Fund Award, and a Dean's Competitive Fund for Promising Scholarship. She currently leads the IMS New Researchers Group. In '23, she was named an International Strategy Forum (ISF) Fellow, as part of the ISF fellowship that recognizes rising leaders ages 25 – 35 from Africa, Asia, North America, and Europe. In '21, she was an invited speaker at the National Academies' symposium on Mathematical Challenges for Machine Learning and Artificial Intelligence. She was also an invited long-term participant at the Simons Institute for the Theory of Computing, UC Berkeley. In '19, she completed her Ph.D. in Statistics from Stanford University, where she received the Theodore W. Anderson Theory of Statistics Dissertation Award ('19) and the Ric Weiland Graduate Fellowship ('17).

