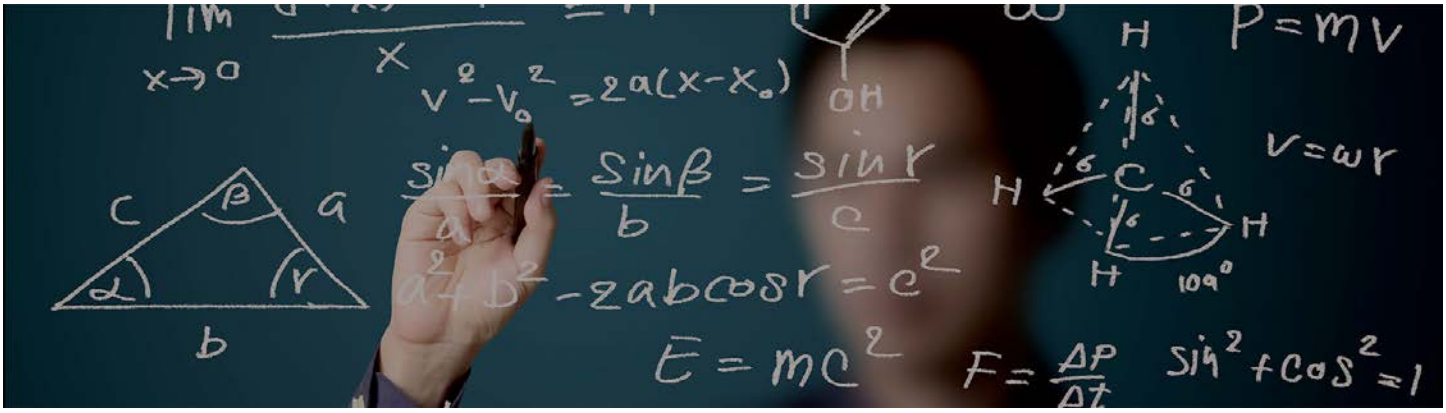


## Fall 2019

# RENSSELAER POLYTECHNIC INSTITUTE

## DEPARTMENT OF MATHEMATICAL SCIENCES COLLOQUIUM

### "Nonconvex Low-Rank Estimation: Geometry, Implicit Regularization, and Robustness"

Abstract: Recent years have seen a flurry of activities in designing provably efficient nonconvex procedures for solving statistical estimation problems. The premise is that despite nonconvexity, the loss function may possess benign geometric properties that enable fast global convergence under carefully designed initializations. In many sample-starved problems, this benign geometry only holds over a restricted region of the entire parameter space with certain structural properties, yet gradient descent seems to follow a trajectory staying within this nice region without explicit regularizations, thus is extremely computationally efficient and admits strong statistical guarantees. In this talk, we will formally establish this "implicit regularization" phenomenon of gradient descent for the fundamental problem of estimating low-rank matrices from noisy incomplete, rank-one, or bilinear measurements, by exploiting statistical modeling in analyzing iterative optimization algorithms via a leave-one-out perturbation argument. We will also discuss an approach called on median-guided truncated gradient descent which is provably resilient to outliers while maintaining computational and statistical efficiency.

Yuejie Chi

Carnegie Mellon University

Monday, September 9, 2019 from 4-5pm

Amos Eaton 216

Refreshments served 3:30-4pm Amos Eaton 4th Floor Lounge

Bio: Dr. Yuejie Chi received the Ph.D. degree in Electrical Engineering from Princeton University in 2012, and the B.E. (Hon.) degree in Electrical Engineering from Tsinghua University, Beijing, China, in 2007. Since 2018, she is Robert E. Doherty Career Development Professor and Associate Professor with the department of Electrical and Computer Engineering at Carnegie Mellon University, after spending 5 years at The Ohio State University. She is interested in the mathematics of data science that take advantage of structures and geometry to minimize complexity and improve performance in decision making. Specific topics include mathematical and statistical signal processing, machine learning, large-scale optimization, sampling and information theory, with applications in sensing, imaging and data science. She is a recipient of the PECASE Award, NSF CAREER Award, AFOSR YIP Award, ONR YIP Award and IEEE SPS Young Author Paper Award.