## Data Science Seminar

Hosted by Department of Mathematical Sciences

■ Date: Tuesday, November 26, 2017

■ Time: 12:00pm - 1:00pm

Room: WH-100E

Speaker: Wei Yang (Binghamton University)

Title: Random Covariance Matrix and the Marchenko-Pastur law

## **Abstract**

Let x be a p-dimensional centered random vector, with some un- known covariance matrix  $\Sigma$ . Let x1, ..., xn be n i.i.d copies of x, we can form

S =sample mean of xi\*xi's

Which is an example of a p $\times$ p random matrix. When  $\{xi \}_{i \in \{n\}}\}$  are realized, S is just a sample covariance matrix. If n is large, S by the Law of Large number is a good estimator for  $\Sigma$ . When the size n is limited, but n, p are comparable, the classical Marchenko-Pastur (MP) Law says that , the eigenvalues of S follows roughly the MP distribution. In this talk, we are going to use the Stieltjes Transformation (Resolvent) method to prove a version of the MP Law. The focus will be on the method of proof, a common technique in the theory of Random Matrices.

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