Stanford University
Departments of Mathematics and Statistics

Probability Seminar

4pm, Monday, October 29, 2019
Sequoia Hall Room 200

Refreshments served at 3:30pm in the Lounge.

Speaker: Elizaveta Rebrova, *UCLA*

Title: Sketching for iterative linear solvers: Strengths, weaknesses, and tools from random matrix theory

Abstract:

A group of projection-based approaches for solving large-scale linear systems is one of the most efficient in its simplicity. For example, the well-known Kaczmarz algorithm iteratively projects the previous approximation x_k onto the solution spaces of the next equation in the system. (An elegant proof of the exponential convergence of this method using correct randomization of the process was given in 2009 by Strohmer and Vershynin, and succeeded by many extensions and generalizations in the works of Needell, Tropp, Ward, Srebro, Tan, etc.) The "sketch-and-project" framework is an interesting unifying view on a number of iterative solvers (introduced by Gower and Richtarik in 2016). One can observe that a random selection of the next equation (or, a subset of equations) can be represented as a sketch, that is, left multiplication by a random vector (or matrix). I will give an overview of some of these methods and discuss the role that random matrix theory plays in proving their convergence. I will then talk about our recent work with Deanna Needell on the block Gaussian sketch and project methods.