Probabilistic Operator Algebra Seminar

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July 19 **Jorge Garza-Vargas**, Caltech

Title: *A New Approach to Strong Convergence*

A family of random matrices $(X_1^N, \ldots, X_d^N)$ converges strongly to a family $(x_1, ..., x_d)$ in a C^*-algebra if $\|P(X_1^N, \ldots, X_d^N)\|$ converges to $\|P(x_1, ..., x_d)\|$ for every noncommutative polynomial P. This phenomenon plays a central role in several breakthrough results in operator algebras and other areas. However, strong convergence is notoriously difficult to prove and has generally required delicate problem-specific methods.

In this talk I will discuss recent joint work with Chi-Fang Chen, Joel Tropp and Ramon van Handel, where we introduce a new flexible and elementary technique for proving strong convergence. As an example, we apply our method to the study of random permutations, generalizing the result of Bordenave and Collins and solving some open problems about random graphs.

In short, our method can be viewed as a machine that takes as inputs qualitative information about the random matrix model (such as weak convergence) and turns it into quantitative results (such as rates of convergence).