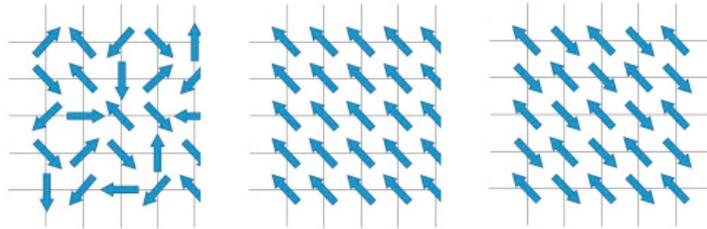


COLLOQUIUM

MATHEMATICS AND STATISTICS
QUEEN'S UNIVERSITY



REPLICA SYMMETRY BREAKING FOR MEAN FIELD SPIN GLASS MODELS

Abstract. In statistical physics, the study of spin glasses was initialized to describe the low temperature state of a class of magnetic alloys in the 1960s. Since then spin glasses have become a paradigm for highly complex disordered systems. Mean field spin glass models were introduced as an approximation of the physical short range models in the 1970s. The typical mean field models include the Sherrington-Kirkpatrick (SK) model, the (Ising) mix p -spin model and the spherical mixed p -spin model. Starting in 1979, the physicist Giorgio Parisi wrote a series of ground breaking papers introducing the idea of replica symmetry breaking (RSB), which allowed him to predict a solution for the SK model by breaking the symmetry of replicas infinitely many times at low temperature. This is known as full-step replica symmetry breaking (FRSB). In this talk, we will show that Parisi's FRSB prediction holds at zero temperature for the more general mixed p -spin model. As a consequence, at positive temperature the level of RSB will diverge as the temperature goes to zero. On the other hand, we will show that there exist two-step RSB spherical mixed spin glass models at zero temperature, which are the first examples beyond the replica symmetric, one-step RSB and FRSB phases. This talk is based on joint works with Antonio Auffinger (Northwestern University) and Wei-Kuo Chen (University of Minnesota).

Qiang Zeng (Northwestern University)

Qiang Zeng obtained his Ph.D. in Mathematics from the University of Illinois at Urbana-Champaign in 2014 under the supervision of Marius Junge and Renming Song. From 2014 to 2015 he was a Postdoctoral Fellow at Harvard University. In 2015, Dr. Song was a Postdoctoral Fellow at the Mathematical Sciences Research Institute in Berkeley, California. Since 2016, he is Boas Assistant Professor at Northwestern University in Evanston, Illinois. Qiang Zeng works at the interfaces of probability, functional analysis and mathematical physics. His main topic of study is noncommutative probability and spin glasses.

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3:30pm · FEBRUARY 14 · 2018