

**Stanford University**  
**Departments of Mathematics and Statistics**

PROBABILITY SEMINAR

4pm, Monday, January 28, 2019  
Sequoia Hall Room 200

Refreshments served at 3:30pm in the Lounge.

**Speaker:** Ahmed El Alaoui, *Stanford EE*

**Title:** On the non-existence of the hard phase on amenable graphs

**Abstract:**

Many statistical reconstruction problems exhibit the following interesting phenomenon: as one increases the strength of the noise, the problem undergoes a sudden transition from being solvable with very simple algorithms to becoming computationally intractable.

We investigate the dependence of this “possible-but-hard” phase on the geometry of the underlying graphical model. We show that isoperimetric properties of the graph are key to its existence or lack there-off: when an inference problem is constructed on a graph sequence that converges locally to an *amenable* graph, then there exists an efficient way to compute the vertex marginals. Consequently, the hard phase can be seen as a purely mean-field phenomenon. This result relies on proving that point-to-set correlations decay. Moreover, this decay may not hold in the non-amenable case.

This is joint work with Andrea Montanari.