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Noise Sensitivity and Sparse Reconstruction in Spin Systems

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I will first give an overview of the main methods of proving noise sensitivity of functions of iid input bits, together with some applications and open problems. I will also explain how little is known about the extension of these ideas to Markov chains with non-iid stationary measures, such as Glauber dynamics for the Ising model.

One application of noise sensitivity ideas is to the following sparse reconstruction problem. Consider a translation-invariant function f of plus/minus spins on some transitive graph, such as Bernoulli percolation or the Ising model on the d-dimensional torus. By learning a small proportion of the spins, can one guess the value of f?

The new results in the talk are based on joint works with Christophe Garban and P·l Galicza.

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