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Title: Reductions and the Complexity of Statistical Problems

Abstract: Inference problems with conjectured statistical-computational gaps are ubiquitous throughout modern statistics, computer science and statistical physics. While there has been success evidencing these gaps from the failure of restricted classes of algorithms, progress towards a more traditional reduction-based approach to computational complexity in statistical inference has been limited. Existing reductions have largely been limited to inference problems with similar structure -- primarily mapping among problems representable as a sparse submatrix signal plus a noise matrix, which are similar to the common hardness assumption of planted clique. In this talk, I will discuss recent work showing that a slight generalization of the planted clique conjecture -- secret leakage planted clique -- gives rise to a variety of new average-case reduction techniques and yields a web of reductions among problems with very different structure. To illustrate these techniques, the focus will be on a reduction showing optimal statistical-computational gaps in robust sparse mean estimation from hardness in a bipartite variant of planted clique. This is based on joint work with Guy Bresler.