Convex Lower Bounds for Free Energy Minimization JONATHAN
MOUSSA, Sandia National Laboratories — We construct lower bounds on free energy with convex relaxations from the nonlinear minimization over probabilities to linear programs over expectation values. Finite-temperature expectation values are further resolved into distributions over energy. A superset of valid expectation values is delineated by an incomplete set of linear constraints. Free energy bounds can be improved systematically by adding constraints, which also increases their computational cost. We compute several free energy bounds of increasing accuracy for the triangular-lattice Ising model to assess the utility of this method.

Jonathan Moussa
Sandia National Laboratories

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