Constrained statistical mechanics for charges and spins

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The statistical mechanics of constrained systems has been developed to describe the properties of exotic frustrated magnetic materials, such as spin-ice. At the same time very similar mathematical tools have been used to create local simulation algorithms for charged systems.

We bring out analogies between the approaches in the two communities, and discuss the effective dynamic equations generated in Monte-Carlo simulations of constrained systems. We will also discuss analogies to quantum electrodynamics and the Dirac procedure and look for analogies to gauge invariance in the effective dynamics.