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Interacting Ensemble of the Instanton-dyons and Deconfinement Phase Transition in the SU(2) Gauge Theory

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Instanton-dyons, also known as instanton-monopoles or instanton-quarks, are topological constituents of the instantons at nonzero temperature and holonomy. Numerical simulations of the ensemble of interacting dyons has been performed for SU(2) pure gauge theory. The focus is the back reaction on the holonomy and the issue of confinement. The free energy has been calculated as a function of the holonomy and the dyon densities, using standard Metropolis Monte Carlo and integration over parameter methods. It is observed that as the temperature decreases and the dyon density grows, the minimum of the free energy indeed moves from small holonomy to the value corresponding to confinement.

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