Abstract Submitted
for the HAW05 Meeting of
The American Physical Society

Confinement- Deconfinement Phase Transition at nonzero Chemical Potential[1] ARIEL ZHITNITSKY, UBC — We present arguments suggesting that large size overlapping instantons are the driving mechanism of the confinement-deconfinement phase transition at nonzero chemical potential μ. The arguments are based on the picture that instantons at very large chemical potential in the weak coupling regime are localized configurations with finite size $\rho \sim \mu^{-1}$. At the same time, the same instantons at smaller chemical potential in the strong coupling regime are well represented by the so-called instanton-quarks with fractional topological charge $1/N_c$. We estimate the critical chemical potential $\mu_c(T)$ where this phase transition takes place as a function of temperature in the domain where our approach is justified. In this picture, the long standing problem of the "accidental" coincidence of the chiral and deconfinement phase transitions at nonzero temperature (observed in lattice simulations) is naturally resolved. We also derive results at nonzero isospin chemical potential μ_I where direct lattice calculations are possible, and our predictions can be explicitly tested.

[1]based on work done with D.Toublan

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Date submitted: 16 May 2005 Electronic form version 1.4