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Confinement in a 2 + 1 Dimensional Center Vortex Model of the Yang-Mills Vacuum DERAR ALTARAWNEH, MICHAEL ENGELHARDT, New Mexico State University — A promising picture of confinement in QCD can be obtained based on a condensate of thick vortices with fluxes in the center of the gauge group (center vortices). We have constructed a concrete realization of this picture. In our model, vortices are represented by closed random lines in 2+1 dimensional space-time. These random lines are modeled as being piece-wise linear and an ensemble is generated by Monte Carlo methods. The physical space on which the vortex lines are defined is a cube with periodic boundary conditions, and we have developed the necessary algorithms which implement those boundary conditions as the vortex lines evolve across the boundaries. When two vortices become close to each other, it is possible that they connect to one another. Also the inverse process, that a vortex separates at a bottleneck, is allowed. Our ensemble therefore will contain not a fixed, but a variable number of closed vortex lines. This is expected to be important for realizing the deconfining phase transition. Using the model, we can investigate both the confinement and the deconfinement phase. We were able to study the potential between quark and anti-quark as a function of vortex density, vortex seqment length, and as a function of temperature.

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