Contribution ID: **337**   Type: **Talk**

Witten index and phase diagram of compactified N=1 supersymmetric Yang-Mills theory on the lattice

Saturday, 18 July 2015 09:00 (20 minutes)

Owing to confinement, the fundamental particles of N=1 Supersymmetric Yang-Mills (SYM) theory, gluons and gluinos, appear only in colourless bound states at zero temperature. Compactifying one space-time dimension with periodic boundary conditions for fermions preserves supersymmetry, and confinement is predicted to persist independently of the length of the compactified dimension. This scenario can be tested non-perturbatively with Monte-Carlo simulations on a lattice. SUSY is, however, broken on the lattice and can be recovered only in the continuum limit. The partition function of compactified N=1 SYM with periodic fermion boundary conditions corresponds to the Witten index. Therefore it can be used to test whether supersymmetry is realized on the lattice. Results of our recent numerical simulations will be presented, supporting the disappearance of the deconfinement transition in the supersymmetric limit and the restoration of SUSY at low energies.

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Session Classification: Physics Beyond the Standard Model

Track Classification: Physics Beyond the Standard Model