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Lattice Formulations of Supersymmetric Gauge Theories with Matter Fields

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Certain classes of supersymmetric gauge theories, including the well known $N=4$ super Yang-Mills (SYM) theory, that takes part in the AdS/CFT correspondence, can be formulated on a Euclidean spacetime lattice using the techniques of exact lattice supersymmetry. Great ideas such as topological twisting, Dirac-Kähler fermions, geometric discretization all come together to create gauge theories that are exact-supersymmetric, gauge-invariant, local and doubler-free on the lattice. In this talk we present the lattice formulations of specific classes SYM theories with matter fields in various representations of the gauge group. We hope that such constructions may further motivate the lattice study of technicolor theories, orbifolding and orientifolding in string theories and Corrigan-Ramond limit.

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