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Simulating N=4 Super Yang-Mills

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N=4 Yang-Mills may be formulated on the lattice in such a way as to preserve one exact supersymmetry. This has remarkable consequences; the beta function of the lattice theory vanishes at one loop, the moduli space of the theory survives to all orders of perturbation theory and a maximum of two fine tunings are required to take the continuum limit.

I will review the formulation and describe the resulting phase diagram of the theory.

In certain parts of the phase

diagram a lattice monopole phase is found whose existence is driven

by the U(1)

sector of the theory. I show how

this lattice artifact phase can be avoided by the addition of a new term to

the lattice action which enforces an approximate projection from a U(N) to an

SU(N) gauge group. With the inclusion of this term simulations can be conducted at arbitrarily

large 't Hooft coupling.

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