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Integrability and Exact Results in N = 2 gauge theories

Any N=2 gauge theory in four dimensions contains a set of local operators made only out of fields in the N=2 vector multiplet that is closed under renormalization to all loops, with SU(2,1|2) symmetry. We present a diagrammatic argument that for any planar N=2 theory the SU(2,1|2) Hamiltonian acting on infinite spin chains is identical to all loops to that of N=4 SYM, up to a redefinition of the coupling constant g^2 → f(g^2). Thus, this sector is integrable and anomalous dimensions can be read off from the N=4 ones up to this redefinition. The functions f(g^2) dubbed as effective couplings encode the relative, finite renormalization between the N=2 and the N=4 gluon propagator and thus can be computed in perturbation theory using Feynman diagrams. For each N=2 theory exact effective couplings can be obtained by computing different exact results for localizable observables such as Wilson loops and the Bremsstrahlung function and by comparing them with their N = 4 counterparts.