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# Diagrammatic Monte-Carlo simulations of the large N SU(N)xSU(N) principal chiral model based on the weak-coupling trans-series expansion

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I present a Diagrammatic Monte-Carlo algorithm for the large N SU(N)xSU(N) principal chiral model, which stochastically samples planar Feynman diagrams of the lattice perturbation theory. The latter is constructed using the Cayley map from SU(N) group manifold to the space of Hermitian matrices. I demonstrate that the Jacobian of this map results in the massive bare lattice propagator with the mass proportional to the bare coupling. This bare mass term ensures that perturbative series are IR finite and do not have factorial divergences at high orders, which makes the series suitable for Monte-Carlo sampling and stochastic summation. On the other hand, since the bare mass is proportional to the coupling itself, the expansion is no longer an expansion in powers of coupling, but rather has the form of trans-series involving both powers and logs of coupling. I discuss possible resurgent structure of these trans-series, the strength of the sign problem in Monte-Carlo sampling, as well as the extension of the present approach to lattice gauge theory.

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