

One-loop beta-function for an infinite-parameter family of gauge theories

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Any field theory is renormalisable once all terms compatible with the symmetries are added to the Lagrangian. One can then in principle attempt to compute the arising renormalisation group flow, and search for fixed points realising the asymptotic safety scenario. However, in practice the terms one needs to add to the Lagrangian contain higher derivatives, and the necessary computation, even at one loop, becomes unrealistic. I report on a one-loop computation where the salting point is taken to be the family of Lagrangians given by an arbitrary function of the self-dual part of the Yang-Mills curvature tensor. All such Lagrangians lead to just second order in derivatives field equations, and so seem to be clearly insufficient to renormalise the arising divergences. However, as I will show, the magic of self-duality makes this family of theories one-loop renormalisable. I will explicitly describe the arising renormalisation group flow in the infinite-dimensional space of coupling constants.

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