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Two-loop renormalisation of non-Abelian gauge theories in $4D$ Implicit Regularisation

The data collected at the LHC does not indicate significant deviations from the predictions of the Standard Model (SM). Taking into account that precision observables can be predicted already at two and three loops, it is evident the necessity to develop stringent tests of self-consistency of the SM. We compute the two-loop β -function of pure Yang-Mills and quantum chromodynamics using the background field method in a fully quadridimensional setup using Implicit Regularization (IREG). Subtleties related to Lorentz algebra contractions/symmetric integrations inside divergent integrals as well as renormalization schemes are carefully discussed within IREG where the renormalization constants are fully defined as basic divergent integrals to arbitrary loop order. Finally, an algorithm for the automated calculation of the β -function was developed in Mathematica.

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Collaboration / Activity

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