High Energy Physics - Lattice

Improved automated lattice perturbation theory in background field gauge

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(Submitted on 11 Nov 2010)

We present an algorithm to automatically derive Feynman rules for lattice perturbation theory in background field gauge. Vertices with an arbitrary number of both background and quantum legs can be derived automatically from both gluonic and fermionic actions. The algorithm is a generalisation of our earlier algorithm based on prior work by L\"uscher and Weisz. We also present techniques allowing for the parallelisation of the evaluation of the often rather complex lattice Feynman rules that should allow for efficient implementation on GPUs, but also give a significant speed-up when calculating the derivatives of Feynman diagrams with respect to external momenta.

Comments:	7 pages, 1 jpeg figure; presented at XXVIII International Symposium on Lattice Field Theory (Lattice 2010), June 14-19, 2010, Villasimius, Italy
Subjects:	**High Energy Physics - Lattice (hep-lat)**; Computational Physics (physics.comp-ph)
Report number:	MKPH-T-10-32
Cite as:	**arXiv:1011.2696v1 [hep-lat]**

Submission history

From: Georg von Hippel [view email]

[v1] Thu, 11 Nov 2010 16:00:31 GMT (159kb,D)

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