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Performance of modern color decompositions for standard candle LHC tree amplitudes

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For more than a decade the current generation of fully automated, matrix element generators has provided hard scattering events with excellent flexibility and good efficiency.
However, as recent studies have shown, they are a major bottleneck in the established Monte Carlo event generator toolchains. With the advent of the HL-LHC and ever rising precision requirements, future developments will need to focus on computational performance, especially at intermediate to large jet multiplicities. We present the novel BlockGen family of fast matrix element algorithms that are amenable for GPU acceleration, making use of modern, minimal color decompositions. Moreover, we discuss the performance achieved for standard candle processes such as V+jets and $t\bar{t}$+jets production.

Significance

This presentation will cover first implementation of novel QCD amplitude methods relevant for next-generation matrix element generators. After previous pathfinder studies, we will present the finished implementation and the resulting significant computational improvements. The resulting algorithms are especially suited for the deployment in modern architectures, but already achieve great performance in the established frameworks.

References

Publication/Talk for pathfinder-study:
https://inspirehep.net/literature/1868130

Experiment context, if any

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