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Computational developments of Madgraph5_aMC@NLO on GPUs and vector CPUs

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This presentation discusses the current status of the reengineering of the Madgraph5_aMC@NLO (MG5aMC) event generator to speed it up and port it to new architectures. The calculation of matrix elements (MEs), which constitutes the computationally intensive part and was previously handled by a scalar Fortran implementation on CPUs, is now offloaded to new implementations using event-level data parallelism with lockstep processing on CPUs (via C++ vectorization) and GPUs. Large overall speedups are thus achieved, while maintaining the look-and-feel of the existing user interface. This approach is not specific to MG5aMC, and could be efficiently exploited in any other ME Monte Carlo event generator. Development efforts are now focusing on the preparation of an upcoming alpha release of the software for the LHC experiments, supporting leading-order QCD processes. In parallel, further performance improvements are also being pursued, including the possible port of the QCD color algebra calculations to GPU tensor cores or their execution in single floating-point precision.

Declaration

I certify that I have checked that I am authorised to submit the abstract with the listed co-authors with their current affiliations

Change of Speaker

I understand that change of speaker is allowed provided that no participant gives more than one talk. Otherwise, we will ask the speaker to choose between one or the other abstract to be presented.

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