

GPUs for Higgs boson data analysis at the LHC using the Matrix Element Method

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The matrix element method utilizes ab initio calculations of probability densities as powerful discriminants to extract small signals from large backgrounds at hadron collider experiments. The computational complexity of this method for final states with many particles and degrees of freedom sets it at a disadvantage compared to supervised classification methods such as decision trees, k nearest-neighbour, or neural networks. We will present a concrete implementation of the matrix element technique in the context of Higgs boson analysis at the LHC employing graphics processing units. Due to the intrinsic parallelizability of multidimensional phase space integration, dramatic speedups can be readily achieved, which makes the matrix element technique viable for general usage at collider experiments.

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