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Estimation of global statistical significance of a new signal within the GooFit framework on GPUs

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GPUs represent one of the most sophisticated and versatile parallel computing architectures that have recently entered in the HEP field. GooFit is an open source tool interfacing ROOT/RooFit to the CUDA platform that allows to manipulate probability density functions and perform fitting tasks. The computing capabilities of GPUs with respect to traditional CPU cores have been explored with a high-statistics pseudo-experiment method implemented in GooFit with the purpose of estimating the local statistical significance of an already known signal. The striking performance obtained by using GooFit on GPUs has been discussed in the previous edition (XII) of this conference. This method has been extended to situations when, dealing with an unexpected new signal, a global significance must be estimated. The LEE is taken into account by means of a scanning/clustering technique in order to consider, within the same background only fluctuation and anywhere in the relevant mass spectrum, any fluctuating peaking behaviour with respect to the background model. The presented results clearly indicate that the systematic uncertainty associated to the method is negligible and that the p-value estimation is not affected by the clustering configuration. A comparison with the evaluation of the global significance provided by the method of trial factors is also provided.

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