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GPUs in LHCb for Analysis

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Datasets with millions of events in charm decays at LHCb have prompted the development of powerful fitting and analysis tools capable of handling unbinned datasets using GPUs and multithreaded architectures.

GooFit, the original GPU fitting program with a familiar syntax resembling classic RooFit, has undergone significant redesign and has expanded physics and computing capabilities. The performance has been improved and tested on a variety of systems. GooFit 2.0 is easier than ever to install, develop, and use on any system.

A new templated header-only library, Hydra, provides highly optimized general framework for fits, Monte Carlo generation, integration, and more. The design and benefits of this system along with initial tests will be shown.

Finally, a model-independent search for direct CP violation using an unbinned approach called an energy test was performed directly using the Thrust library (which both of the previous packages are based on). Public results from this analysis and performance comparisons will be presented.

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