

Implementation of a Thread-Parallel, GPU-Friendly Function Evaluation Library

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GooFit is a thread-parallel, GPU-friendly function evaluation library, nominally designed for use with the maximum likelihood fitting program MINUIT. In this use case, it provides highly parallel calculations of normalization integrals and log (likelihood) sums. A key feature of the design is its use of the Thrust library to manage all parallel kernel launches. This allows GooFit to execute on any architecture for which Thrust has a backend, currently, including CUDA for nVidia GPUs and OpenMP for single- and multi-core CPUs. Running on an nVidia C2050, GooFit executes as much as 300 times more quickly for a complex high energy physics problem than does the prior (algorithmically equivalent) code running on a single CPU core. This talk will focus on design and implementation issues, in addition to performance.

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