Contribution ID: **61**   Type: **Oral**

Model-independent partial wave analysis using a massively-parallel fitting framework

Monday 10 October 2016 11:00 (15 minutes)

Based on GooFit, a GPU-friendly framework for doing maximum-likelihood fits, we have developed a tool for extracting model-independent S-wave amplitudes from three-body decays such as D+ −> h(')-,h+,h+. A full amplitude analysis is done where the magnitudes and phases of the S-wave amplitudes (or alternatively, the real and imaginary components), are anchored at a finite number of $m^2(h(')-,h+)$, and a cubic spline is used to interpolate between these points. The amplitudes for P-wave and D-wave resonant states are modeled as spin-dependent Breit-Wigners. GooFit uses the Thrust library to launch all kernels, with a CUDA back-end for nVidia GPUs and an OpenMP back-end for compute nodes with conventional CPUs. Performance on a variety of these platforms is compared. Execution time on systems with GPUs is a few hundred times faster than running the same algorithm on a single CPU.

Tertiary Keyword (Optional)

High performance computing

Primary Keyword (Mandatory)

Analysis tools and techniques

Secondary Keyword (Optional)

Parallelizarion

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Session Classification: Track 5: Software Development

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