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Accelerating RooFit with GPUs

Wednesday 1 December 2021 18:00 (20 minutes)

RooFit is a toolkit for statistical modelling and fitting, and together with RooStats it is used for measurements and statistical tests by most experiments in particle physics, particularly the LHC experiments. As the LHC program progresses, physics analysis becomes more computationally demanding. Therefore, the focus of RooFit developments in recent years was performance optimization. Recently, much of RooFit's core functionality has been re-implemented to either use GPUs or the vector instructions on the CPU, depending on the available hardware.

This presentation will explain which parts of RooFit are implemented to benefit from these hardware accelerators and demonstrate the performance improvements for typical binned and unbinned fits. An overview of the underlying computation library will be given, illustrating how one can reuse the same code for both GPU and CPU libraries and showing the necessary steps to implement custom pdfs.

We will also talk about which remaining RooFit functionality will be ported to hardware accelerators in the future, e.g. the analytic integration of probability densities. Finally, we will highlight other new RooFit features available in the upcoming release, including new functionality specific to PyROOT and new ways to pass the results of auxiliary measurements to the model.

Significance

References

<https://indico.cern.ch/event/868940/contributions/3814689/>

<https://indico.cern.ch/event/708041/contributions/3272134/>

Speaker time zone

Compatible with Europe

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Session Classification: Track 2: Data Analysis - Algorithms and Tools

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