Contribution ID: **116**   Type: **Talk**

Scaling RooFit's Automatic Differentiation Capabilities to CMS Combine

Tuesday 10 June 2025 12:00 (25 minutes)

RooFit's integration with the Clad infrastructure has introduced automatic differentiation (AD), leading to significant speedups and driving major improvements in its minimization framework. Besides, the AD integration has also inspired several optimizations and simplifications of key RooFit components in general. The AD framework in RooFit is designed to be extensible, providing all necessary primitives to efficiently traverse RooFit's computation graphs.

CMS Combine, the primary statistical analysis tool in the CMS experiment, has played a pivotal role in ground-breaking discoveries, including the Higgs boson. Built on RooFit, CMS Combine is making AD a natural extension to improve performance and usability. Recognizing this potential, we have begun a collaborative effort to bridge gaps between the two frameworks with a core focus of enabling AD within CMS Combine through RooFit.

In this talk, we will present our progress, highlight the challenges encountered, and discuss the benefits and opportunities that AD integration brings to the CMS analysis workflow. By sharing insights from our ongoing work, we aim to engage the community in furthering AD adoption in high-energy physics.

Authors: LANGE, David (Princeton University (US)); REMBSER, Jonas (CERN); VASILEV, Vassil (Princeton University (US))

Presenter: VASILEV, Vassil (Princeton University (US))

Session Classification: Methods and tools

Track Classification: Methods and tools