



Contribution ID: 345

Type: oral presentation

Recent Developments of the ROOT Mathematical and Statistical Software

Wednesday, September 5, 2007 2:00 PM (20 minutes)

Advanced mathematical and statistical computational methods are required by the LHC experiments to analyze their data. These methods are provided by the Math work package of the ROOT project. We present an overview of the recent developments of this work package by describing in detail the restructuring of the core mathematical library in a coherent set of new C++ classes and interfaces. We will describe how this new core Math library has been integrated in the ROOT framework and it is used by the ROOT analysis objects. We will present as well the achieved improvements, in terms of performances and quality, of numerical methods present in ROOT, such as random number generations, or matrix computations. Furthermore, we will review the new developments in the fitting and minimization packages, where new classes have been introduced to extend the previously existing functionality and to provide consistent interfaces to the users. We will present as well the recent and planned developments of integrating in the ROOT environment new advanced statistical tools required for the analysis of the LHC data.

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Session Classification: Software components, tools and databases

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