Developments of Mathematical Software Libraries for the LHC experiments

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The main objective of the MathLib project is to give expertise and support to the LHC experiments on mathematical and statistical computational methods. The aim is to provide a coherent set of mathematical libraries. Users of this set of libraries are developers of experiment reconstruction and simulation software, of analysis tools frameworks, such as ROOT, and physicists performing data analysis.

After having performed a detailed evaluation of the existing functionality present in GSL,a general purpose mathematical library, and in more HEP specific libraries such as CLHEP, CERNLIB and ROOT, a new object oriented library has been started to be developed. The new library incorporates or uses most of the functions and algorithms of the already existing libraries. Examples of these functions and algorithms are mathematical special functions, linear algebra, minimization and any other required numerical algorithms.Wrappers to these are written in C++ and integrated in a coherent object oriented framework. Interfaces to the Python interactive environment are as well provided.

An overview of the project activities will be presented, describing in detail the current functionality of the library and its design. Furthermore, the object oriented implementation of Minuit, a fitting and minimization framework, will be covered in the presentation.

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