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# The LHCb simulation software: Gauss and its Gaussino core framework

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The LHCb experiment underwent a major upgrade for data taking with higher luminosity in Run 3 of the LHC. New software that exploits modern technologies in the underlying LHCb core software framework, is part of this upgrade. The LHCb simulation framework, Gauss, is adapted accordingly to cope with the increase in the amount of simulated data required for Run 3 analyses. An additional constraint rises from the fact that Gauss also relies on external simulation libraries.
The new version of Gauss, based on a newly-developed, experiment-agnostic core framework where the generic simulation components have been encapsulated, is called Gaussino. This simulation framework allows easier prototyping and testing of new technologies where only the core elements are affected. Gaussino provides a plug&play mechanism for modelling collisions and interfacing generators like Pythia and EvtGen. It relies on Gaudi for general functionalities and the Geant4 toolkit for particle transport, combining their specific multi-threaded approaches. A fast simulation interface to replace the Geant4 physics processes with a palette of fast simulation models for a given sub-detector, including new deep learning based options, is the most recent addition. Geometry layouts can be provided through DD4Hep or experiment-specific software. A new, built-in mechanism to define simple volumes at configuration time can ease the development cycle.
In this contribution, will describe the structure and functionality of Gaussino, as well as its more recent developments and performance. We will also show how the new version of Gauss exploits the Gaussino infrastructure to match the requirements of the simulation(s) of the LHCb experiment.

## Significance

Exposition of a major experiment agnostic simulation framework.

## References

## Experiment context, if any

LHCb

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