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The LHCb Alignment framework

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The LHCb alignment framework allows clients of the LHCb detector description software suite (DetDesc) to modify the position of components of the detector at run-time and see the changes propagated to all users of the detector geometry. DetDesc is used in the simulation, digitization and reconstruction phases of data processing and the alignment framework is available in all these stages.

The alignment framework provides a very easy way to implement deviations from the LHCb design alignment, allowing tasks such as reconstruction with a detector with off-nominal alignment and misalignment simulation studies. It also allows for tasks that require a dynamic change in the alignment constants of the detectors, like iterative alignment algorithms.

Components of the LHCb detector will be re-aligned after each fill, and the changes in the alignment constants will be required for on-line and off-line reconstruction. The alignment framework is deeply coupled to the LHCb Conditions Database, adding automatic time-dependent updating of alignment information to all LHCb software.

The requirements, design and implementation of the Alignment framework shall be presented and illustrated with results from performance studies.

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