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Performance of the LHCb tracking system in Run I of the LHC

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The LHCb tracking system consists of a Vertex Locator around the interaction point, a tracking station with four layers of silicon strip detectors in front of the magnet, and three tracking stations, using either straw-tubes or silicon strip detectors, behind the magnet. This system allows to reconstruct charged particles with a high efficiency (typically $> 95\%$ for particles with momentum > 5 GeV) and an excellent momentum resolution (0.5% for particles with momentum < 20 GeV). The high momentum resolution results in very narrow mass peaks, leading to a very good signal-to-background ratio in such key channels as $B_s \rightarrow \mu\mu$. Furthermore an optimal decay time resolution is an essential element in the studies of time dependent CP violation. Thanks to the excellent performance of the tracking system, a decay time resolution of ~ 50 fs is obtained, allowing to resolve the fast B_0 s oscillation with a mixing frequency of 17.7 ps $^{-1}$. In this talk, we will give an overview of the track reconstruction in LHCb and review its performance in Run I of the LHC. We will highlight the challenges and improvements of the track reconstruction for the data taking period from 2015 on, discussing efforts to improve the timing in the online reconstruction as well as approaches to unify the online and offline reconstruction.

Collaboration

LHCb Collaboration

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