

Comprehensive studies on calibration parameters of the LHCb Upstream Tracker

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The Upstream Tracker is a novel silicon microstrip detector installed during LHCb Upgrade 1. Since its successful commissioning, it has played a significant role in the experiment's new fully-software trigger system. The efficient performance of the UT detector requires constant monitoring and evaluation of the calibration parameters of over half a million sensors. Here, recent results regarding those parameters will be presented, and a few persisting issues will be addressed.

The analysed datasets come from different calibration measurements taken in the second half of 2024. They served as input for extensive studies regarding time evolution and spatial distributions of individual noise components, followed by a comparative analysis for different types of silicon sensors. Additional studies concerned the stability of readout chip configuration registers in terms of single-event upsets.

The results that will be discussed show that the Upstream Tracker demonstrates overall stable performance in all analysed calibration parameters. However, several local deviations have been identified, and there is an ongoing effort to minimise their influence on the detector's performance. The strategies for tackling the single-event upset issue will also be mentioned, as well as the prospects for further analysis developments with possible application of unsupervised Machine Learning methods.

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