

Status report of the UT project for LHCb

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A large upgrade of the LHCb detector is foreseen during the LHC second Long Shutdown when the Upstream Tracker (UT) will replace the currently installed TT. Being composed of new, high-granularity silicon micro-strip planes with a larger coverage, the UT will cope with an instantaneous luminosity of $2 \times 10^{33} \text{ cm}^{-2}/\text{s}$ adding up to at least 50 fb⁻¹. It will provide a fast momentum measurement while also improving the overall quality of reconstructed tracks.

The LHC beam pipe traverses the UT body and poses further mechanical and thermal requirements on its construction and operation, especially in the transition regions at the walls of the UT. The UT sensors will be cooled by liquid CO₂ to temperatures around -20°C to improve the lifetime in the presence of a large particle flux. In order to place the UT sensors as close as possible to the beam pipe, thus further improving the LHCb track reconstruction efficiency, yet ensuring safe thermal conditions of the beam pipe, a series of thermal tests has been performed on a prototype. One particular challenge is moreover the alignment of the sensors since a precision of a few hundred microns is desired. Within the scope of additional mechanical tests, the integration of UT components (readout cables, CO₂ cooling pipes, supports for services) as well as the alignment of the silicon staves has been studied on a special prototype box. In this presentation, the results of these tests as well as the overall status of the project will be presented.

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