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CO2 cooling for the LHCb Upgrade

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A large upgrade of the LHCb detector is ongoing during the LHC Second Long Shutdown (LS2) and the Upstream Tracker (UT) will replace the TT detector inside LHCb. Being composed of new, high-granularity silicon micro-strip planes (staves) with a larger coverage, the UT will cope with an instanteneous luminosity of $2x10^33$ cm^2/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 silicon sensors and the ASICs of the UT will be cooled using two-phase CO2. The corresponding CO2 cooling plant MAUVE is a set of two sub-plants which are dedicated to cool the VELO and the UT. In case of a sub-plant failure, the remaining sub-plant can provide backup cooling to both subdetectors.

The thermal properties of the UT box as well as the coolant flow characteristics inside the staves play an important role for the detector operation. A set of tests has been performed to determine the most suitable CO2 coolant temperature for the UT and choose an appropriate restriction orifice to create the desired pressure drop. The results of these tests will be presented in this talk. Furthremore, an overview will be given over the status of the MAUVE project including the technical design, the construction of the plant and the most recent commissioning results.

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