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Evaporative CO2 pressure drops: comparison between measurements and calculations

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CO2 is becoming the main refrigerant for HEP detector thermal management. It has several advantages to achieve a compromise between material budget and cooling performance. The design of the cooling circuits for the Phase 2 CMS Tracker is being supported with a Matlab tool that implemetns correlations for liquid and 2-phase CO2 pressure drops. An analysis has been performed comparing the predictions of this MATLAB tool with measurements on real Phase-2 Outer Tracker cooling circuits to assess the accuracy of the correlations. Two Phase-2 CMS tracker subdetectors (TB2S and TBPS) with slightly different inner diameters of stainless steel pipe have been studied. The results of the measurements and the calculations are shown in the above-mentioned comparison, and the possible causes of the observed discrepancies are discussed, including a temporary solution for the design process.

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