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zig-zagging CO₂ evaporation cooling system R&D

Design, prototype production and thermal test of a new cooling system for the the Upgrade of the UT Tracker for LHCb, based on vertical not straight CO₂ boiling channels at about -30 °C.

Summary

Proposing a new cooling system for the the Upgrade of the UT Tracker for LHCb, emerged a design with a zig-zagging routing for the CO₂ evaporative cooling. This is needed to satisfy the power dissipation extraction requirements dictadited by the use of powerful read-out chips. The strip tracker detector silicon sensors need to be maintained at operating temperature of -5 °C, the genrated thermal power is about 3800 W. The investigated solution looks at two stave design: one using straight pipes embedded in carbon foam and making use of high conductivity TPG inserts put trough the insulation layers to improve the thermal performance; the other, more efficient solution from the thermal point of view, envisages a “snake” cooling pipe embedded in carbon foam, passing underneath the chip concentrated power sources in a very effective way.

Primary author: COELLI, Simone (I.N.F.N. Milano)

Presenter: COELLI, Simone (I.N.F.N. Milano)

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