



Contribution ID: 18

Type: **not specified**

System design challenges for CO₂ evaporative cooling in tracking detectors

CO₂ evaporative cooling has become one of the most popular thermal management technologies for silicon detectors to be operated at low temperature. At LHC, this solution is already in use on the LHCb Velo, the ATLAS IBL and the CMS Phase I Pixel. The LHCb Velo upgrade and the UT detectors will be cooled in the same way as of 2019, as well as ATLAS and CMS upgraded tracking and vertexing detectors for the HL-LHC (2025).

In order to fully exploit the heat removal capacity which can be achieved with carbon dioxide in evaporative mode, the cooling system needs a very careful design, combining the process, the transfer lines and the on-detector evaporators.

This presentation discusses the challenges for the design of an optimised CO₂ cooling system, including the mechanics, the thermal interfaces and the process instrumentation for controls and monitoring. Examples of presently adopted solutions are given, together with their limits and the needed further development in order to achieve reliable systems of much higher cooling power as in HL-LHC detectors.

Primary author: TROPEA, Paola (CERN)

Presenter: TROPEA, Paola (CERN)