Contribution ID: **50** Type: **not specified**

Development of advanced micro-channel cooling solutions for silicon detectors

Wednesday 19 June 2019 16:40 (15 minutes)

Position-sensitive silicon tracking detectors at collider experiments and elsewhere require advanced solutions for mechanical support and cooling. Integrated low-mass systems must be developed that offer efficient heat removal and miminize the impact of the support and cooling systems on the material budget of the detector.
Cooling the detector through micro-channels in silicon offers an attractive solution. The close contact of the sensor and the heat sink yield unprecedented cooling performance, while the close match of the thermal expansion coefficients minimize distortions of the detector. A proof of principle for micro-channel cooling is provided by the NA62 Gigatracker, that has successfully deployed micro-channels in silicon cooling plates in a HEP experiment. The LHCb VELO upgrade is expected to push the frontier further in the near future, with bi-phase cooling in micro-channels. The growing interest in the HEP community is driving increased R&D on advanced micro-channel cooling solutions. This effort is supported in part by the AIDA2020 project. Key areas of research and development are the micro-channel manufacturing process and in-house capabilities of several institutes, the establishment of reliable models to predict the cooling performance and the development of reliable and low-mass connectors. Several groups have developed integrated solutions, where the micro-channels are embedded in the silicon sensor itself.
In this contribution, a brief overview is presented of recent advances in R&D, as well as some ideas to enhance the communication and coordination of this incipient effort.

Presenters: MAPELLI, Alessandro (CERN); VOS, Marcel (IFIC Valencia (ES)); PETAGNA, Paolo (CERN)

Session Classification: Discussion on future R&D and a possible R&D collaboration