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Light prototype support using microchannel technology as high efficiency system for silicon pixel detector cooling .

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The development of microscale mechanical system has been growing rapidly getting the opportunity to satisfy to the request of the semiconductor detectors to have ever more power located on the active region. Miniaturization associated to microtechnologies allow the design of microsystem structures able to cool silicon pixel detector with specific power of the order of some W/cm² with less than 0.3% of radiation length . Using microchannel technology we present design and thermo hydraulic results for low material budget support and cooling obtained through forced liquid convection, developed for Layer-0 of SuperB silicon vertex tracker.

The support prototypes, realized in composite material (CFRP) and with different geometries , has been tested in the thermo-fluid dynamic test bench in the INFN Pisa laboratory.

The experimental results confirm the finite-element analysis studies conducted on computational model .

Moreover, looking forward to cooling systems fully integrated on silicon wafers, some mechanical tooling tests actually in progress and the design of a module prototype are shown .

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