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Liquid-based micro-channeling for efficient FPGA cooling

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Heterogeneous computing solutions for real-time event reconstruction are an emerging trend for future designs of trigger and data-acquisition systems, especially in view of the upcoming high-luminosity program of the LHC. FPGA devices offer significant improvements on latency when highly-parallelised algorithms, also based on machine-learning solutions, are coded and deployed on such devices. In this context, standard air-based cooling is not adequate and new solutions are needed to effectively exploit the full computing potential of these high-density devices. In this abstract we present our work in simulating, designing, constructing and testing a liquid-based micro-channeling solution that demonstrates efficient cooling. Our solution enables the deployment of more complex and powerful algorithms on FPGA devices, thus enhancing the performance and reliability of real-time event reconstruction.

Alternate track

1. Detectors for Future Facilities, R&D, Novel Techniques

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