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Programmable readout electronics for radiation environments

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Instrumentation for future colliders will require electronics that works under harsh conditions which includes levels of radiation that varies depending on the collider proposal but also on the actual detector configuration. Having the possibility to instrument a detector with reconfigurable hardware opens many possibilities for versatile designs and for functionality modification after fabrication. Many detector components of e+e- colliders experiments share with LHC Muon detectors low radiation scenarios and thus can profit from the versatility of using newly available radiation tolerant FPGAs instead of ASICs for on detector electronics.
A board design that is capable of performing the readout of detectors that work under harsh conditions is presented. This board is built around reconfigurable hardware that has been tested under radiation. It integrates more than 200 input channels and allows output bandwidths of up to 40 Gbps.
The design includes protection mechanisms that allow working reliably under radiation and with little supervision.
This board is intended to be used in the CMS upgrade in the near future and discussions for using it in other experiments are taking place. The design is versatile enough to be accommodated in a large variety of detectors.

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