

Low-power radiation-tolerant digital systems for tracking detectors in LHC experiments

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- Background: The forthcoming upgrade of the LHC will cause an increase of luminosity/energy: more radiation will be generated in all experiments, particularly near the collision point where the tracker system is. ABCNext chip is a proposed upgrade of the current tracker system front-end. ABCNext must be capable of working in an environment with higher levels of radiation and must have increased functionality compared with the current version, with a minimal increase in the overall power consumption. The power restriction is imposed by the impossibility of increasing the heat dissipation capacity of the tracker system.

Objectives

- The scope of this work will focus on the design of SEU protection for low power digital circuits. Therefore it is expected the development of digital design techniques applicable to integrated circuits design and FPGA, to 1) reduce the sensitivity to SEU and 2) reduce power consumption.
- The work includes the development of automatic tools for use by IC designers in different phases of the design flow. A test chip designed according to the proposed methodologies will be used to validate guidelines and supporting tools.