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Single Event Upset evaluations of CBC readout chips

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The CMS Binary Chip (CBC) is the front-end ASIC to be used by the CMS tracker following its upgrade for High Luminosity LHC operation. It will instrument modules known as 2S-modules to read out silicon microstrip sensors which are intended to identify high transverse momentum particles in real time so that tracking data can be used for the first time in the L1 trigger. The CBC should be robust against Single Event Upsets and various design features have been incorporated to achieve that. The CBC development is now complete.

The SEU rate has been measured several times using different versions of the CBC in a series of tests in a 62 MeV proton beam to evaluate its sensitivity for use in the CMS tracker. Each version of the chip (CBC2, CBC3.0, CBC3.1) has increased the digital circuitry, and hence the SEU susceptibility, and has also been subject to design improvements which affect the SEU tolerance. The relevant design features are explained and SEU measurements are reported. The expected SEU rates in CMS 2S-modules at the HL-LHC are estimated.\

Submission declaration

Original and unpublished

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