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Effects Of Gamma Irradiation On Leakage Current In CMOS Readout Chips For Atlas Upgrades Silicon Strip Tracker

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As part of ATLAS Phase-II upgrade project for the High-Luminosity Large Hadron Collider (HL-LHC), an irradiation experiment using a 60Co source was carried out at Brookhaven National Lab to characterize the leakage current from the 130 nm CMOS technology ABCStar chip as a function of the total ionizing dose (TID). The ABCStar chips were held at -10o and 0o C and received dose rates ranging from 0.6 to 2.5 Krad/h. The outcome of the ABCStar irradiation is presented and compared with previous irradiation campaigns utilizing the ABC130 prototype chips, which were irradiated under similar dose rates and temperatures.

Summary

An irradiation experiment using a 60Co source was carried out at Brookhaven National Lab to characterize the leakage current from the ABC star front end readout chip as a function of the total ionizing dose (TID). The chips were at conditions similar to what is expected in the HL-LHC. Three ABCStar chips were held at -10o C and received a dose rate of 2.5 Krad/h, 1.1 Krad/h and 0.6 Krad/h respectively. A fourth ABCStar was held at 0o C and received a dose rate of 0.6 Krad/h. The outcome of the ABCStar irradiation is presented and compared with previous irradiation campaigns utilizing the prototype readout chips, the ABC130, which were irradiated under similar dose rates and temperatures. The results will help provide an understanding of the physical processes behind the TID effects.

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