Contribution ID: **57** Type: **Poster**

Charge collection studies of neutron irradiated double sided silicon strip detectors for double metallization or cable interconnections for the end strips

Thursday, May 28, 2015 9:09 AM (0 minutes)

The Compressed Baryonic Matter (CBM) experiment is one of the major scientific pillars at FAIR at Darmstadt, Germany which aims to explore the QCD phase diagram in the regions of high net baryon densities and moderate temperatures. The Silicon Tracking System (STS), the core detector of the CBM experiment, is located in the dipole magnet to provide track reconstruction and momentum determination of charged particles from beam-target interactions. The STS will be populated with about 1300 double-sided silicon microstrip detectors (DSSDs) mounted onto a low-mass carbon fiber support structures. The strips on one side of the DSSDs are tilted to have 7.50 stereo angle. This allows to reconstruct multiple hits from the same detector at the expense of a poorer spatial resolution in vertical direction. To have read out only from one detector side, the end strips from one edge of the detector were connected to the end strips on the other edge. This interconnection can be provided via double metallization or by using external interstrip cables. The prototype detectors (with double metallization or with external cables) were irradiated to neutron equivalent fluences of 2×1014 neqcm−2, as they are expected for the worst case scenario in the CBM experiment. These detectors were tested for the leakage current, capaciatance variation with bias voltage and for charge collection. Test results from these prototype sensors both before and after irradiations will be presented.

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Session Classification: Solid State Detectors - Poster Session

Track Classification: S6 - Solid State Detectors