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Testbeam results of n+-in-p planar pixel sensor of quad ASIC pixels and high momentum resolution pixel detectors

An n+-in-p planar pixel semiconductor tracking detector is being developed with HPK for the ATLAS detector upgrade of high luminosity LHC (HL-LHC). The novel design of single-FE-I4 size (20.9 x 18.5 mm squared) planar pixel sensor with 250x50 micro-meter squared has been developed and tested using FE-I4 read out ASIC. The module with four-FE-I4 on single pixel sensor (41.2 x 35.7 mm squared) are produced and tested to emulate actual installation of ATLAS detector. For the pixels located inter pixel region need “ganging” structure which is Aluminum rail connecting inter ASIC pixels to the normal pixels to readout signals via normal pixel. The effect to the efficiency by the ganging structures are tested with and without irradiation corresponding fluence of HL-LHC operation. Irradiation are preformed at CYRIC Tohoku University, with 70MeV protons. As high momentum resolution pixel detector, 500x25 micro-meter squared size pixel detectors are developed to have twice better resolution for bending direction of charged particle in solenoid magnet. In this talk performance study using testbeam results for quad ASIC pixel detector and high momentum resolution detector are presented.

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