**Irradiation study of a high voltage monolithic pixel sensor in 55nm technology**

The High-Voltage Monolithic Active Pixel Sensors (HV-MAPS) become an attractive technology option for tracking detectors in high energy physics. This technology combines sensor and readout electronics in a single chip, making it compact and efficient. The development of HVCMOS sensor has mainly been implemented with 180 nm or 130 nm technology in the past decades.

To explore the small node technology of next generation HVCMOS sensors, a prototype chip has been fabricated for Multi Project Wafer (MPW) running with 55 nm HVCMOS technology and low resistivity for next-generation particle detectors.

To assess radiation hardness, the chips have been irradiated with 80 MeV protons at room temperature using the Chinese Spallation Neutron Source facility. The irradiation study focused on evaluating key operational parameters such as leakage current, signal-to-noise ratio, and charge collection efficiency under increasing irradiation dose.

In this article we present the detailed design of this 55nm HVCMOS pixel sensor, discusses its performance based on radiation test and compare the performance with non-irradiated sensors.

Keywords: High Voltage CMOS; monolithic active pixel sensor; 55 nm technology; particle tracking detectors