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## HV-CMOS pixel detectors in BCD8 technology

This paper describes the first pixel detectors realized with the BCD8 technology by STMicroelectronics.

The BCD8 is a 160 nm process integrating bipolar, CMOS and DMOS devices and it is mostly used for automotive application. A version with 70 V voltage capability has been tested to evaluate its suitability for the realization of CMOS sensors with a depleted region of several tens of micrometer.

Sensors featuring  $50 \times 250 \mu\text{m}^2$  pixels on a  $125 \Omega\text{cm}$  resistivity substrate have been characterized showing a uniform breakdown at 70 V before irradiation, as expected by design in this technology, and a capacitance of about 80 fF at 50 V reverse bias voltage.

The response to ionizing radiation is tested using radioactive sources and an X-ray tube, reading out the detector with an external spectroscopy chain. At the nominal 50 V bias, the device can detect soft X-rays, whose ionization yield is comparable to a minimum ionizing particle in the depletion region, demonstrating the detector is suitable also for charged particle detection and tracking application.

Irradiation tests were performed up to proton fluences exceeding  $5 \times 10^{15} \text{ p/cm}^2$  and they show that depletion and breakdown voltages increase with irradiation.

The presentation will review the main results of the sensor performance characterization and radiation hardness measurement, as well as the design of an integrated front-end electronics, including a charge preamplifier, a comparator and a threshold tuning DAC, that can be coupled to the ATLAS FE-I4 chip for readout.

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