Contribution ID: **20** Type: **WG1 - Monolithic Sensors**

H2M –Characterization of a MAPS in a 65 nm CMOS Imaging Process

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Monolithic Active Pixel Sensor (MAPS) are among the most promising options for vertex detectors in future lepton colliders. Manufactured in a TPSCo 65 nm CMOS imaging process, the Hybrid-to-Monolithic (H2M) prototype advances this sensor type in the context of high-energy physics applications. The design process employed a digital-on-top design flow, and studied the portability of hybrid pixel detector architecture into a monolithic chip.

The prototype has a sensitive area of 2.24×0.56 mm², and contains 64×16 square pixels with a pitch of 35 µm. The layout of the sensitive area makes use of process modifications to maximize the charge collection by means of a low dose n-type implant with a gap at the pixel boundaries. Each pixel features analog and digital front-end electronics with a Krummenacher-type charge sensitive amplifier, threshold trimming, and 4 readout modes to facilitate time-of-arrival, or time-over-threshold measurements, hit counting, or triggered readout.

Laboratory and test-beam characterization of the prototype shows full functionality of the chip within expectations from simulation, a hit-detection efficiency better than 99 %, and a spatial resolution on the order of 11 µm, all unperturbed by thinning down to 21 µm. A measured non-uniformity of the in-pixel response related to the size and location of the n-wells in the analog circuitry is qualitatively confirmed by simulation.

Type of presentation (in-person/online)

in-person presentation

Type of presentation (I. scientific results or II. project proposal)

I. Presentation on scientific results

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