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ATLASPix3 Serial powering and multi-chip module studies for future HV-CMOS tracker

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High voltage CMOS pixel sensors are proposed in many future particle physics experiments such as the HL-LHC upgrades and future circular colliders. The ATLASPIX3 chip consists of 49000 pixels of dimension 50µm x 150 µm, realised in in TSI 180nm HVCMOS technology. It was the first full reticle size monolithic HVCMOS sensor suitable for construction of multi-chip modules and supporting serial powering through shunt-LDO regulators. The readout architecture supports both triggered and triggerless readout with zero-suppression. With the ability to be operated in a multi-chip setting, a 4-layer telescope made of ATLASPix 3.1 was developed, using the KIT GECCO readout system. To demonstrate the multi-chip capability and for its characterisation, a beam test was conducted at DESY using 3–6 GeV positron beams with the chips operated in triggerless readout mode with zero-suppression. Detailed electrical characterisations of the regulators will be presented as well as multi-chip (quad module) readout and serial powering prototyping.

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