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## Performance of the large scale HV-CMOS pixel sensor MuPix8

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The Mu3e experiment is searching for the charged lepton flavour violating decay  $\mu^+ \rightarrow e^+ e^- e^+$ , aiming for an ultimate sensitivity of one in  $10^{16}$  decays. In an environment of up to  $10^9$  muon decays per second the detector needs to provide precise vertex, time and momentum information to suppress background. The detector consists of cylindrical layers of  $50 \mu\text{m}$  thin High Voltage Monolithic Active Pixel Sensors (HV-MAPS) placed in a  $1 T$  magnetic field, which allow a precise vertex and momentum reconstruction. Additional layers of fast scintillating fibre and tile detectors are providing sub-nanosecond time resolution.

The MuPix8 chip is the first large scale prototype, proving the scalability of the technology. It was produced in the AMS aH18 180 nm HV-CMOS process. It consists of three sub-matrices, each providing an untriggered datastream with more than 10 MHits/s. The latest results from laboratory and testbeam characterisation will be presented, showing an excellent performance with efficiencies  $> 99.6\%$  and a time resolution better than 10 ns achieved with time walk correction. Further, first results from the new prototype MuPix9 will be highlighted and the R&D roadmap towards the final Mu3e chip will be shown.

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