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The Very Large HV-MAPS Tracking Telescope

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The MuPix-telescope is a continuously evolving tracking telescope with very high rate capabilities that makes use of the most recent high-voltage monolithic active pixel sensor (HV-MAPS).
The nominal structure consists of three tracking layers of 100 μm thin HV-MAPS chips, at present MuPix10, and a DUT layer, complemented by scintillating tiles for additional time information. MuPix10 is a completely monolithic sensor with an active area of about 20 mm$\times$20 mm, manufactured in the 180 nm HV-CMOS process at TSI semiconductors with a pixel size is of 80 μm$\times$80 μm. The trigger-less readout uses a column-drain architecture with on-chip zero suppression. 8b/10b encoded hit data is sent out by three serial links with up to 1.6 Gbit/s each.
In the context of pixel sensor R&D, this telescope is used to investigate efficiency, time resolution, and noise behaviour of different MuPix-like sensors. In this talk, the telescope concept is introduced. Highlights of several test beam campaigns at DESY and PSI will be presented which have been performed using a MuPix10- and an ATLASPix3-telescope.

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