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Performance and integration studies with a large scale HV-MAPS prototype:

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Precise tracking at high rates of low momentum particles requires novel

pixel technologies. Monolithic approaches are good candidates to fulfill the requirements of precision experiments like Mu3e, as they have a very low radiation length. The newest member of the MuPix prototype family - which is developed in the context of Mu3e –is the 1x2 cm large MuPix8. It features a fully functional on-chip state machine, time-walk compensation circuits, 6bit charge measurement, on-chip zero suppression and 3+1 serial data links running at 1.25 Gbits/s. The time resolution of the MuPix8 is measured to be below 13 ns. Efficient test beam campaigns as well as integration studies are performed by building a four layer tracking telescope, which is the focus of this talk. The high rate capability of the MuPix8 in combination with the low material budget (chips can be thinned to 50 um) offer high performance at various facilities. The telescope system features on-FPGA time sorting, online efficiency estimation and monitoring. The MuPix and the telescope DAQ can handle 1 MHz track rate. Additional scintillating tiles deliver precise reference timing of 1 ns. Concept, realization and performance of the telescope will be addressed. In addition, results form MuPix8 testbeam campaigns will be presented.

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