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Development of beam telescopes with high time resolution based on Timepix3 and 4 ASICs

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A high rate beam telescope based on the Timepix3 ASIC has been built in order to perform detailed studies of tracking prototypes using charged particle beams. The telescope is optimised for spatial precision, reaching < 1.6 μm pointing resolution. Timepix3 features per pixel TDCs with a bin size of $\approx$, and after detailed systematic correction, a temporal precision of 680 (270) ps per plane (track) was achieved. The most recent results from the Timepix3 telescope will be presented.

The success of the Timepix3 telescope led to the proposal of a new 4D beam tracker based on the Timepix4 ASIC that has TDCs with 60 ps RMS precision per pixel, which leads to unprecedented improvements in the pattern recognition. The ASIC has been submitted at the end of 2019 and detector assemblies are expected by summer 2021. The conceptual design of a Timepix4 telescope will be discussed.

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