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### First tracks and initial timing results with Timepix4 Detectors

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A single arm beam telescope based on the recently developed Timepix4 ASIC was built in order to perform first tests of synchronous multiple-detector readout and track reconstruction. The Timepix4 is a hybrid pixel detector readout ASIC designed to record time-of-arrival (TOA) and time-over-threshold (TOT) simultaneously in each pixel. It has a 448x512 pixel matrix with square pixels at a 55  $\mu\text{m}$  pitch. The TOA is digitised with a 195 ps TDC bin size and the TOT is proportional to the charge collected by the silicon sensor. The telescope is composed of four planes with n-on-p silicon sensors. Two of these planes are instrumented with 300  $\mu\text{m}$  thick sensors tilted with respect to the beam, to provide high quality spatial measurements, while the remaining two have 100  $\mu\text{m}$  thick sensors to achieve a better time response. Each detector assembly (sensor + Timepix4 ASIC) is cooled by a 3D printed titanium block directly attached to the test PCB, through which a cooling fluid is circulated. The cooling block has a circular cut-out to minimise the amount of material traversed by incident particles. The Timepix4 ASICs are read out by the FPGA based SPIDR4 systems, capable of 10 Gbit ethernet readout. In addition to the Timepix4-based detectors, scintillators were placed in the beam acceptance (2 upstream and 1 downstream of the telescope) in order to give a reference timing measurement. The signals from the scintillators are treated with a constant fraction discriminator for optimal temporal resolution. The discriminated signal is digitised by TDCs in the Timepix4 ASIC with the same resolution as the pixels. First tracks were reconstructed using information from all four planes, which allows the assessment of temporal resolution using high energy particles. In this presentation, the initial results of the timing and spatial resolution of this telescope and plans for the complete telescope will be shown.

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