

# TelePix2: A HVCMOS pixel sensor for Fast Timing and Region of Interest Triggering

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The DESY II Test Beam Facility offers electrons with a user selectable momentum ranging from 1-6 GeV primarily utilised for detector characterisation. Beam telescopes are precise reference tracking systems. Whilst providing a very high spatial resolution, they provide no timestamps for individual hits within the readout frame. The length of this readout frame means the telescopes frequently read out hits from multiple electrons together, without an additional segmented timing layer, it becomes impossible to assign tracks to specific triggers. Additionally a size mismatch between the trigger of the telescope and the test device leads to inefficient data taking. To overcome this, a configurable region of interest trigger is needed.

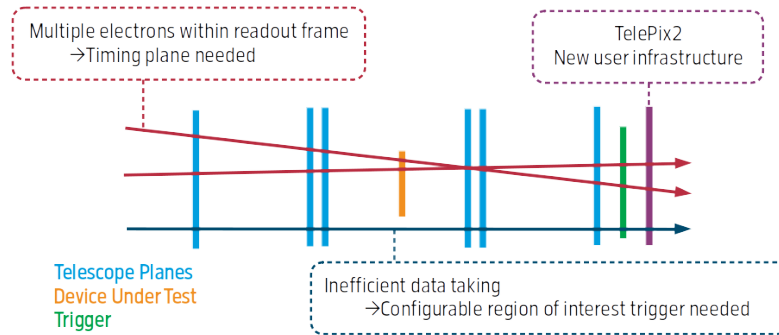


Figure 1: Simplified schematic of a test beam setup illustrating the need for TelePix2

TelePix2 is the newly developed and characterised sensor supplied as test beam infrastructure. By employing TelePix2 in their setup, users can take advantage of 4 ns timestamp provided to remove ambiguities in tracking caused by the long readout frame of the telescope. Additionally, TelePix2 can be configured to provide a fast digital ended trigger output. This has a configurable region of interest down to the level of individual pixels.

Here, characterisation results of TelePix2 are presented based on the latest test beam measurements. A time resolution, without additional corrections for time-walk and pixel to pixel fluctuations, below 4 ns was found at an efficiency above 99% at a depletion voltage of -85 V. The time resolution of the trigger output from TelePix2 is around 2.5 ns. TelePix2 is utilised by users successfully and is currently transitioning to regular user infrastructure at the DESY II Test Beam Facility.