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Characterization of a 180nm CMOS pixel sensor prototypes for the CEPC vertex detector

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The proposed Circular Electron Positron Collider (CEPC) imposes new challenges for the vertex detector in terms of pixel size and material budget. A Monolithic Active Pixel Sensor (MAPS) prototype, TaichuPix, based on a data-driven structure and a column drain readout architecture, has been implemented to achieve high spatial resolution and fast readout. In December 2022, a beam test system of 6 layer TaichuPix-3 chips was tested in DESY TB21 beamline. The offline analysis results indicate the spatial resolution can reach 5um, and the detection efficiency is better than 98%. The baseline vertex detector was designed with a 6-ladder structure with double-sided TaichuPix-3 chips. Another beam test was performed in April 2023 to verify the performance of the vertex detector prototype. The team has recorded enough valid data during the beam test and the offline analysis is working in progress.

Collaboration / Activity

CEPC vertex detector

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