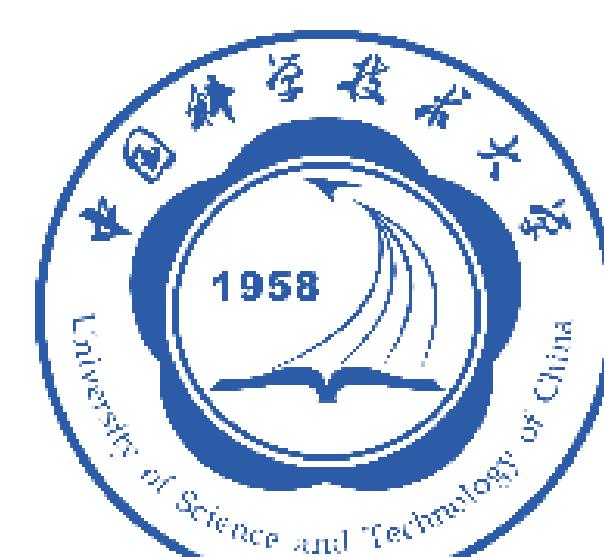


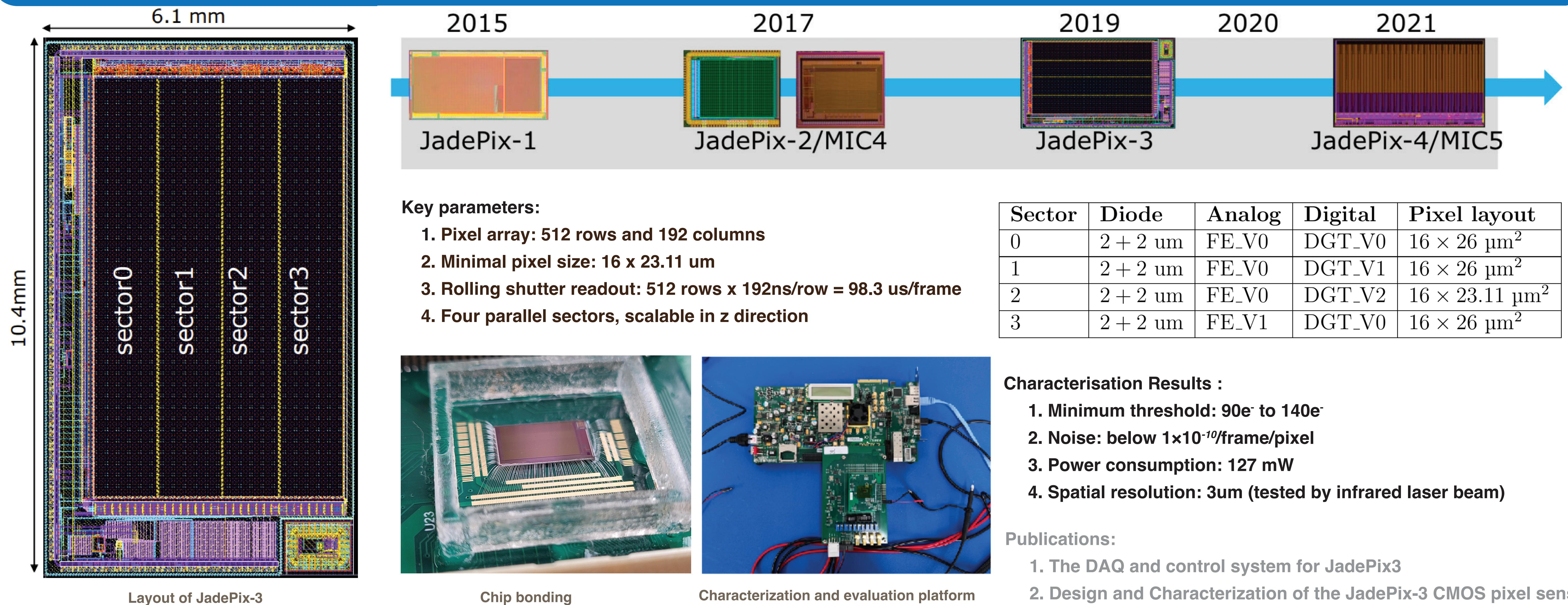


Research of the JadePix-3 Beam Telescope

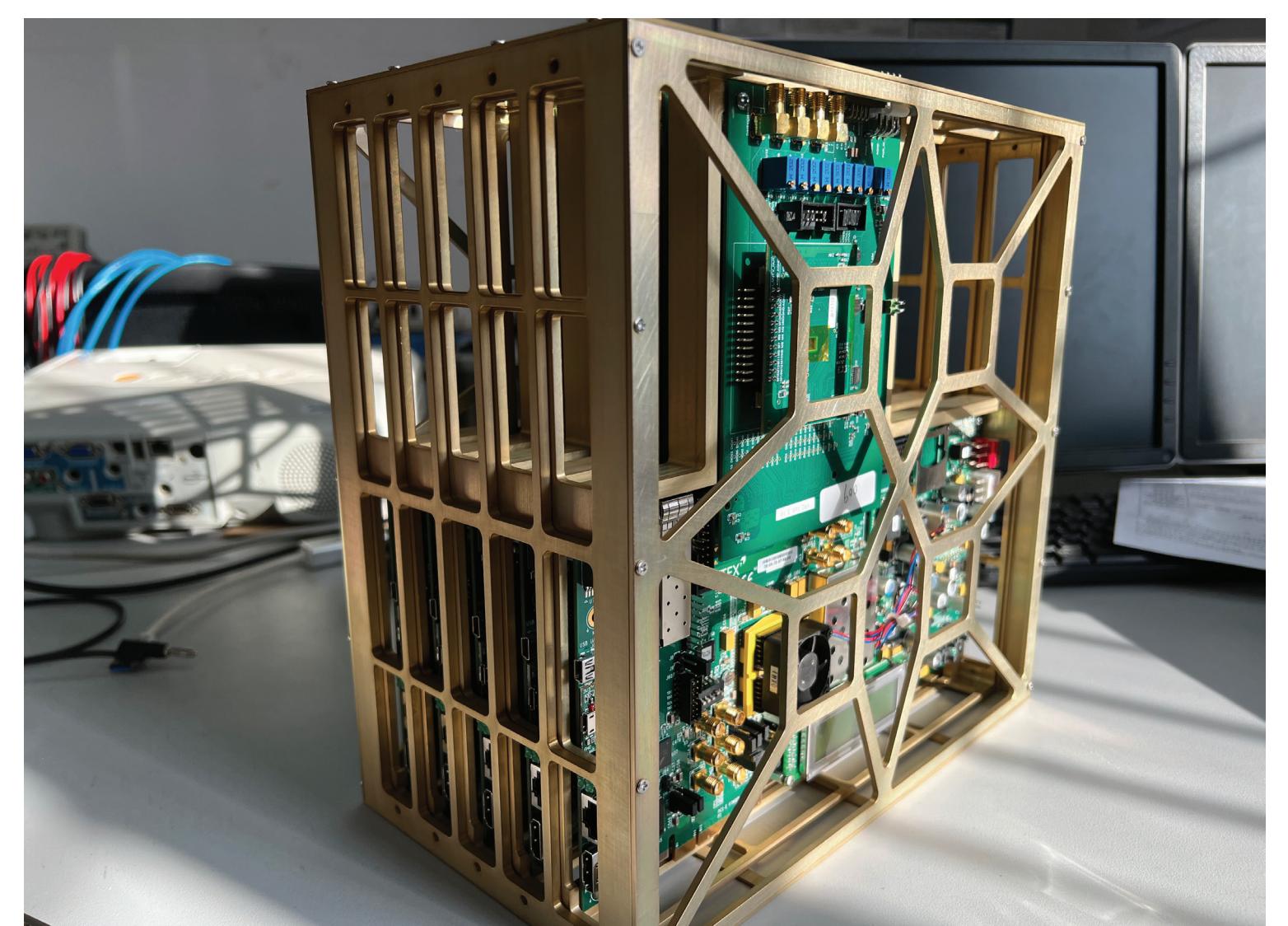


Abstract: JadePix-3, one of the prototype designs for the CEPC vertex detector, prioritizes the investigation of two crucial performance metrics: spatial resolution and power consumption. Developed using the TowerJazz CIS 180nm process, JadePix-3 is a fully functional, large-scale detector chip. It achieves a remarkable spatial resolution of less than 5um and an integration time of under 100us, while maintaining a power consumption of approximately 50 mW/cm². These parameters have surpassed international standards, positioning JadePix-3 as an ideal candidate for beam telescope design due to its low noise level and high resolution capabilities. By utilizing the beam telescope, further advancements can be made in exploring the potential of CMOS silicon pixel detectors with enhanced precision, based on the foundation of JadePix-3.

THE JADEPIX-3



TELESCOPE DESIGN



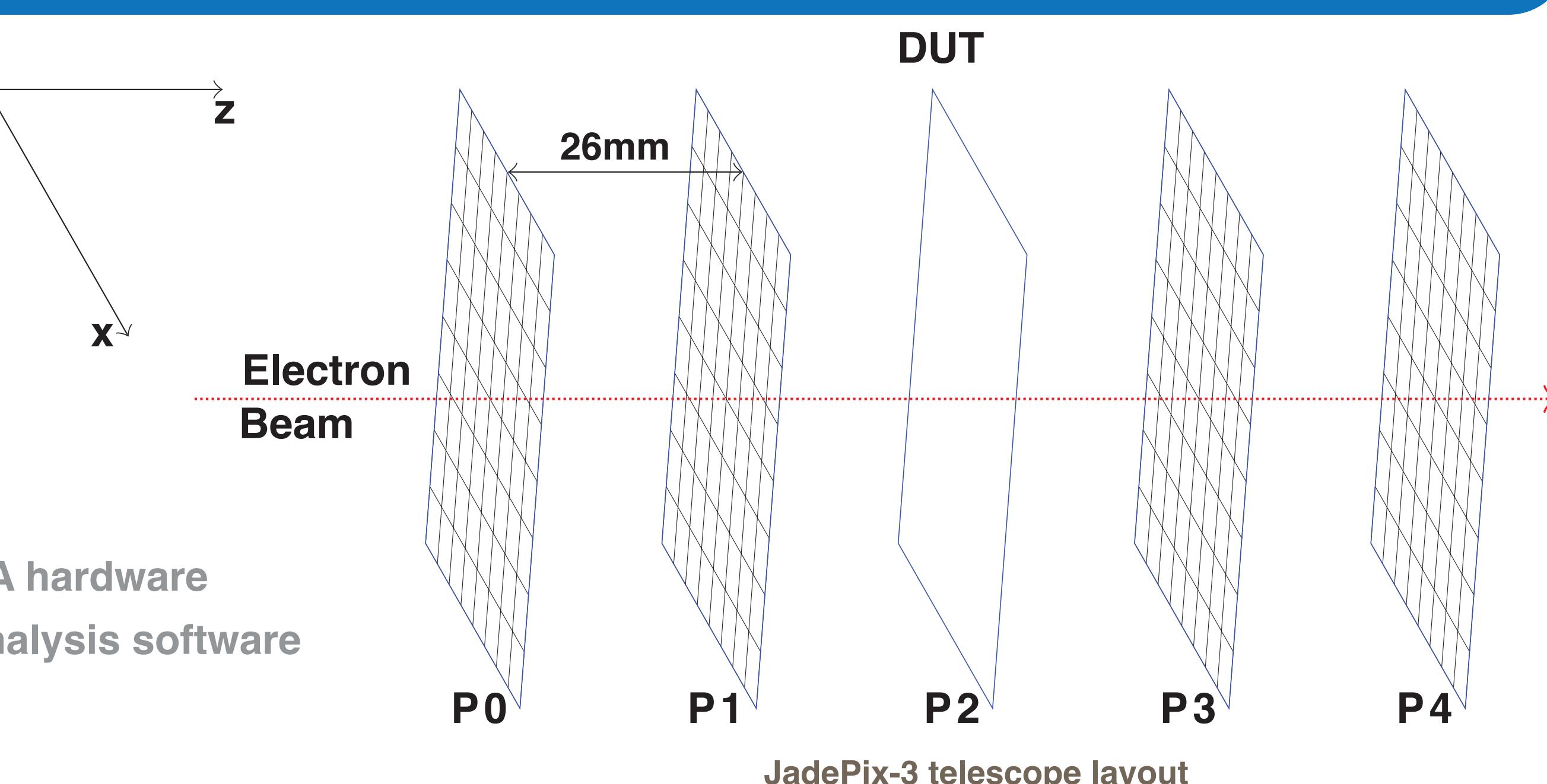
JadePix-3 telescope framework

Beam Telescope Design:

1. Synchronized clock fanout system
2. IPbus¹ based distributed readout and control system
3. Corryvreckan² integrated for offline data analysis

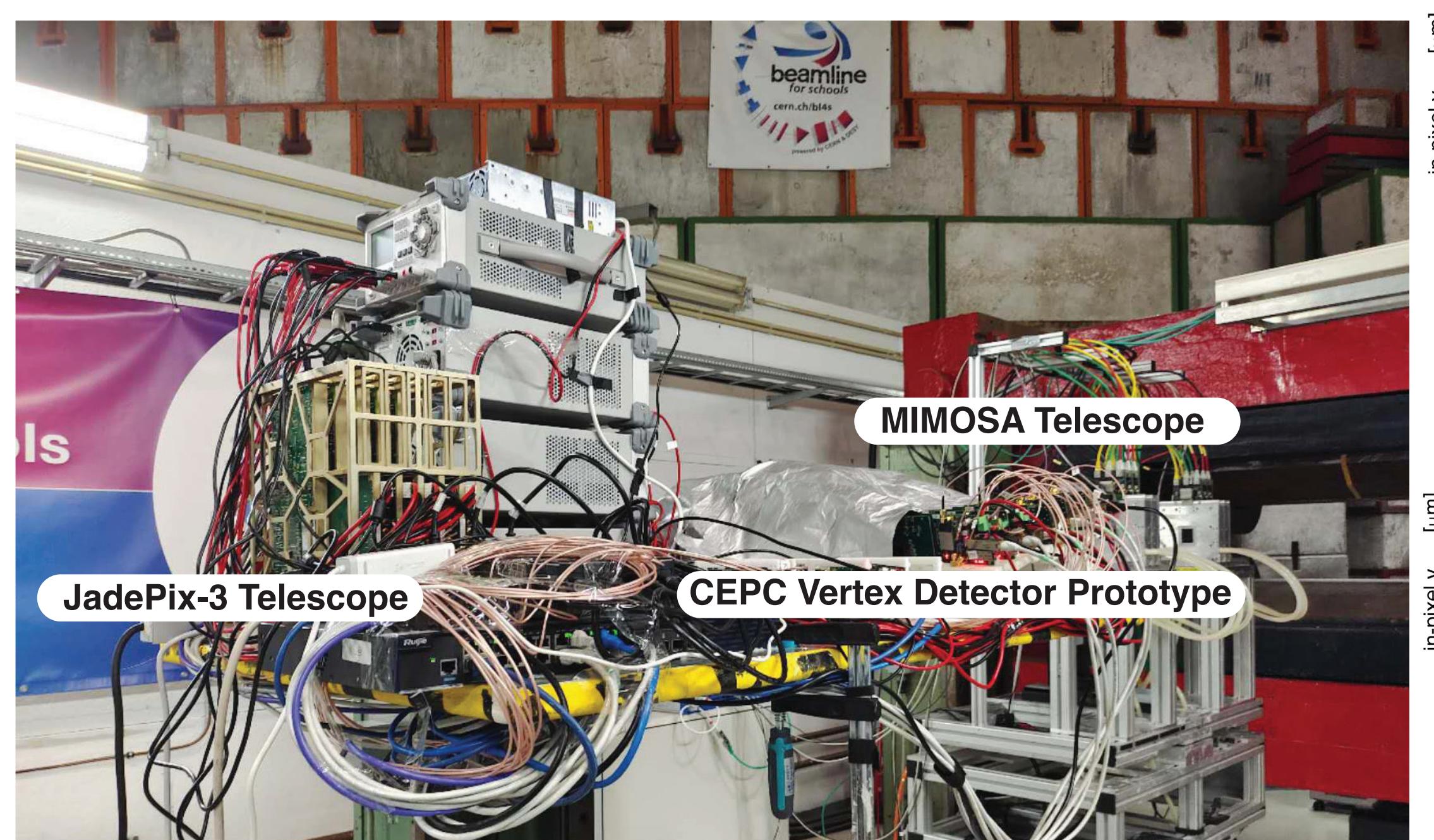
¹ IPbus: a flexible Ethernet-based control system for xTCA hardware

² Corryvreckan: a modular 4D track reconstruction and analysis software for test beam data

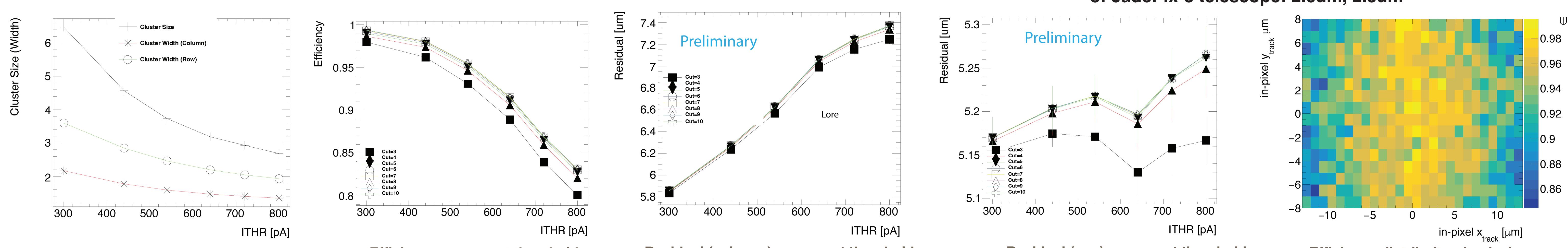
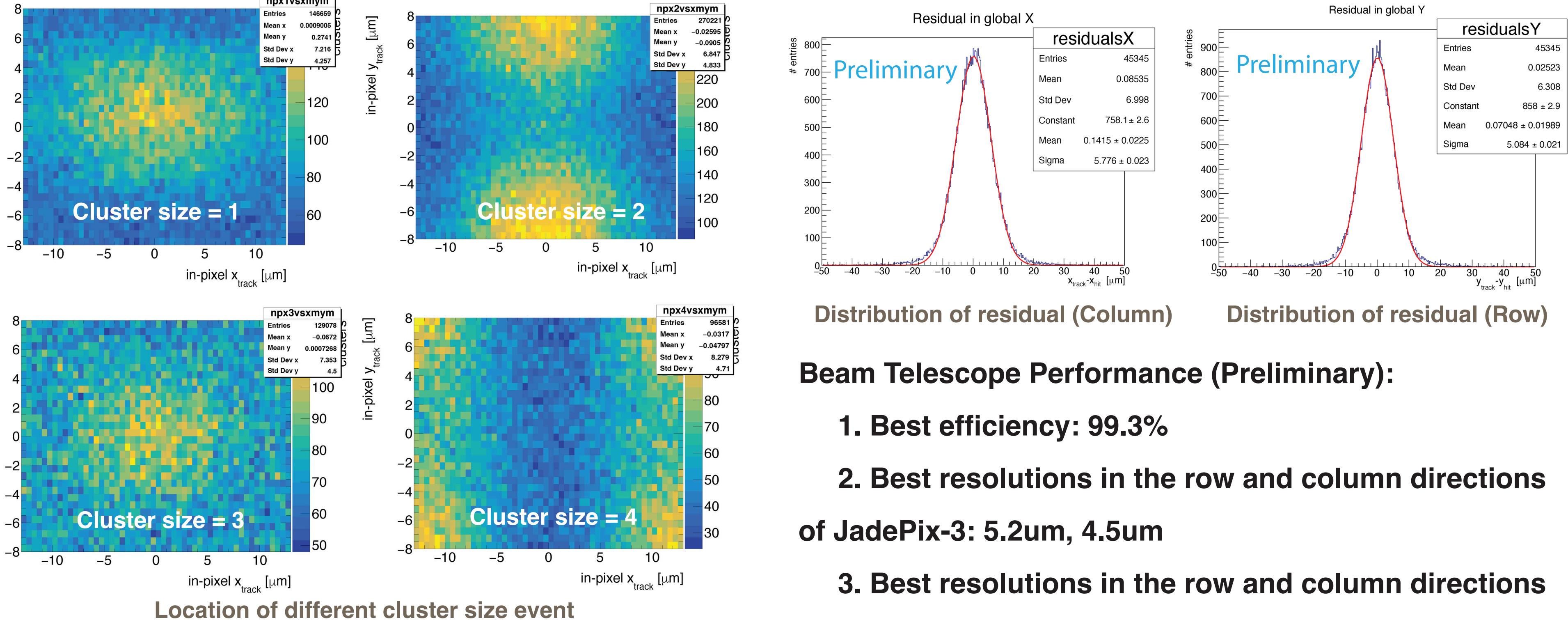


JadePix-3 telescope layout

BEAM TEST AND PRELIMINARY ANALYSIS RESULTS



Beam test setup 2023 @DESY TB21



Sheng Dong¹, Yunpeng Lu¹, Zhiliang Chen², Jia Zhou¹, XingYe Zhai³, Lailin Xu², Hulin Wang⁴, Qun Ouyang¹

¹INSTITUTE OF HIGH ENERGY PHYSICS, CAS ²UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA ³JILIN UNIVERSITY ⁴CENTRAL CHINA NORMAL UNIVERSITY