

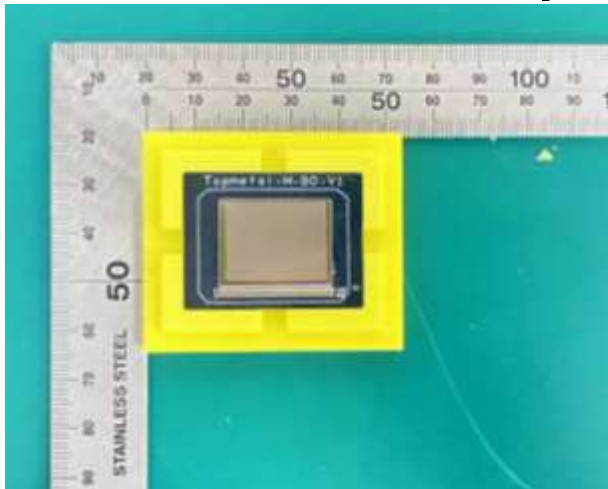
Hi'Beam-SEE: a real-time high-resolution Single Event Effects locating device for heavy ion facilities



Jianwei Liao, Honglin Zhang, Shun Liao, Jiangyong Du, Haibo Yang, Yanhao Jia, Chengxin Zhao *

* chengxin.zhao@impcas.ac.cn

- Heavy ion positioning system
 - Locating the trajectory of each particle within the beam.
- Single event detection system
 - Detecting single event effects that occurred in the device under test.
- Online multi-track locating algorithm
 - Beam reconstruction and calculating the sensitive map.



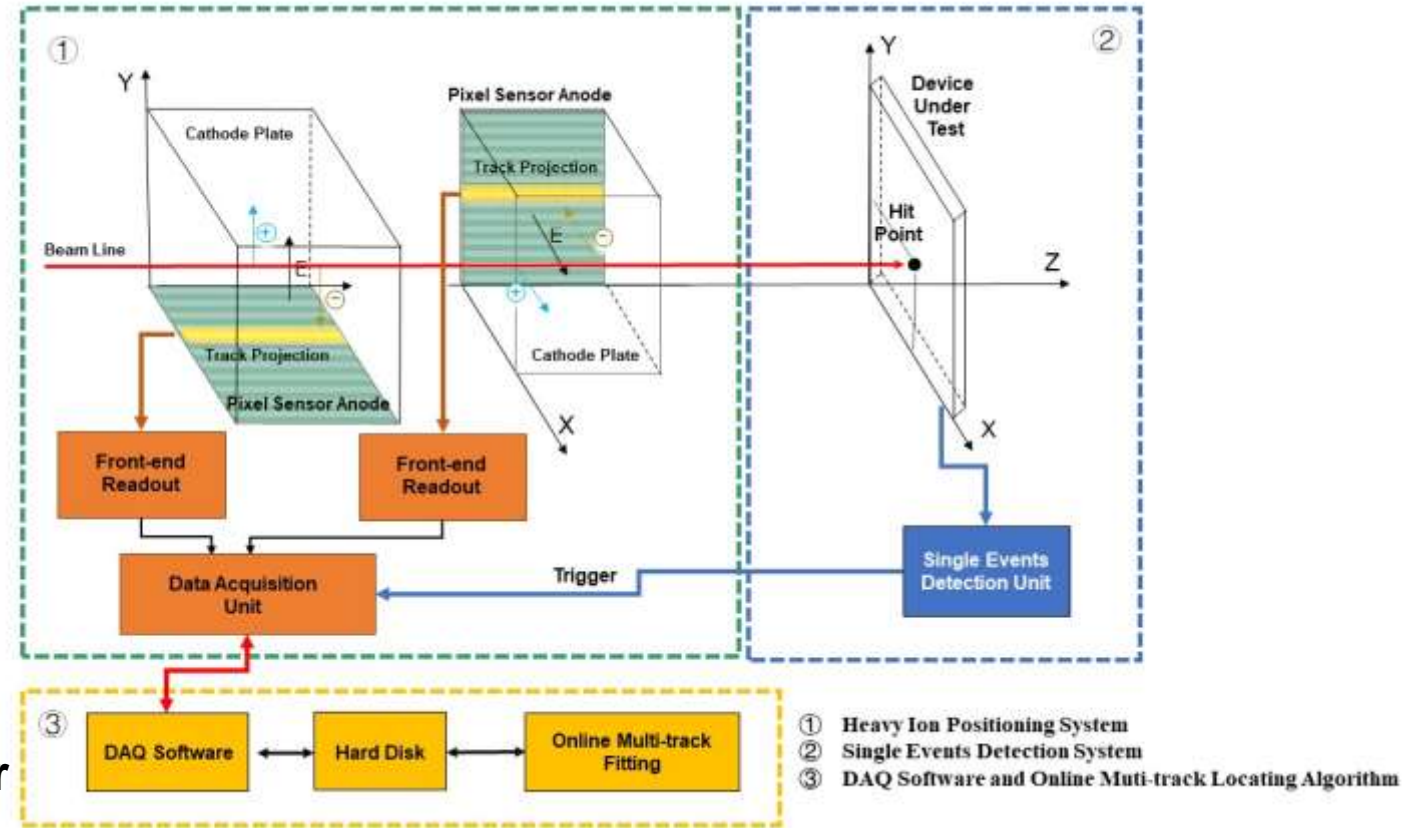
Topmetal-M sensor

Total size:

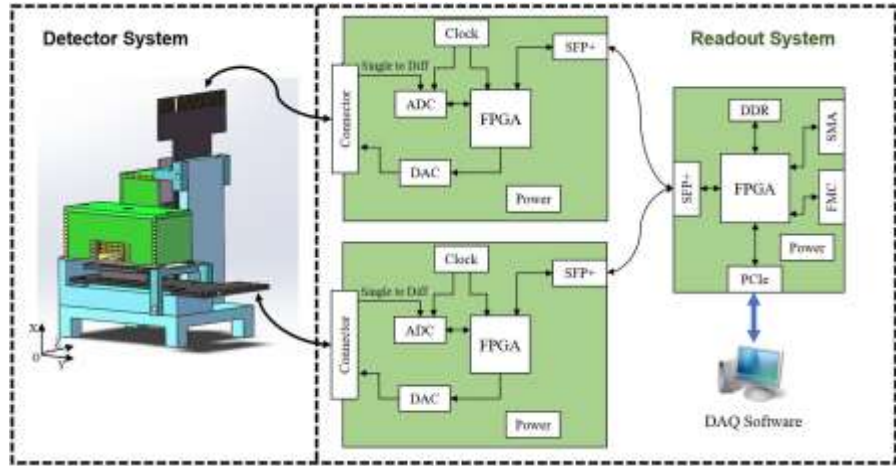
- 23 mm × 18 mm

Pixel size:

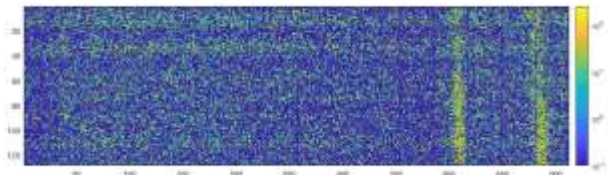
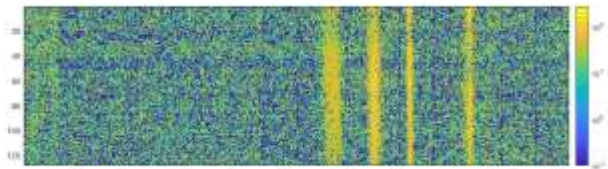
- 40 μm × 40 μm



■ Heavy ion positioning system



Data rate: ~10 Gb/s



Beam test result:

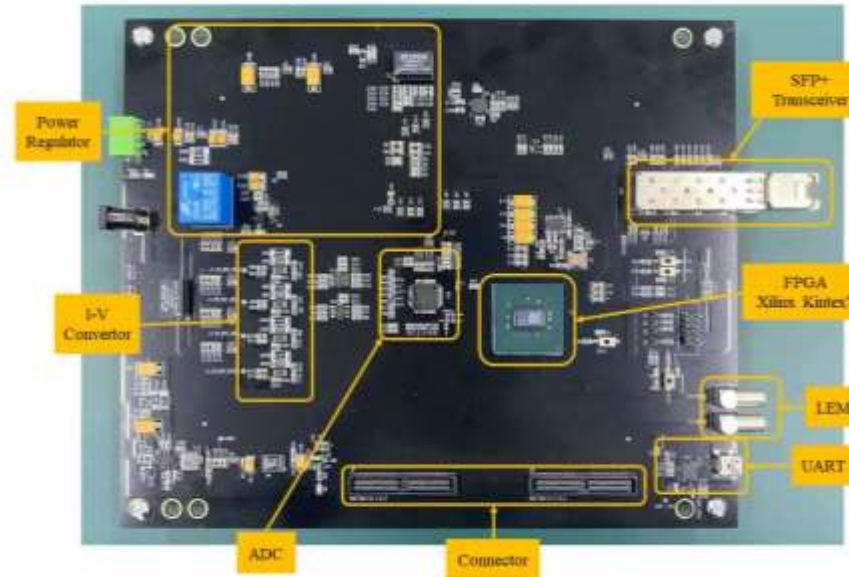
$^{181}\text{Ta}^{35+}$ 16 MeV/u

Spatial resolution:

$5.61 \pm 0.66 \mu\text{m}$ in XOZ planer

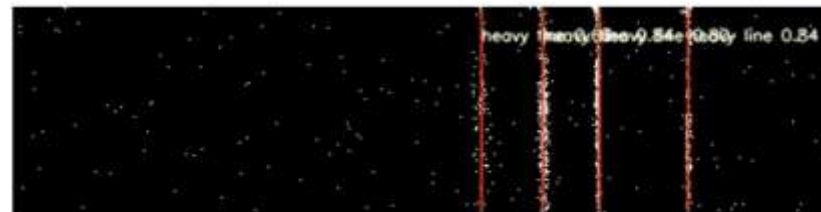
$3.95 \pm 0.40 \mu\text{m}$ in YOZ planer.

■ Single event detection system



Main board + test board
10 μs resolution for SEL test

■ Online multi-track locating algorithm



Spatial resolution: $4.54 \mu\text{m}$

Speed: 110+ fps

Maximum rate: 25 track