

Hybrid Silicon Pixel Detector Telescope

Columbia, Fermilab, LANL

- We are building a hybrid pixel telescope for the forward direction of PHENIX using BTeV-type pixel sensors and the BTeV pixel readout chip FPIX2.1.

- A new pixel telescope will be built for MTest based on the PHENIX telescope using a prototype of the DAQ system being developed for PHENIX.

Current Telescope:

- 50 μ x 400 μ pixels.
- 0.5 cm x 0.5 cm aperture (9k pixels).
- DAQ limited to ~15 KHz.

New Telescope:

- 50 μ x 400 μ pixels (same).
- 3.5 cm x 3.5 cm aperture (270k pixels).
- High speed DAQ (> 1 MHz).

- The upstream end of MT6A was outfitted by the BTeV pixel group and used to test prototype silicon pixel sensors and readout chips (FPIX0, FPIX1, & FPIX2).

- 1st BTeV beam test used a silicon strip detector telescope with SVX-2 ASICs and a modified CDF bench test DAQ system.

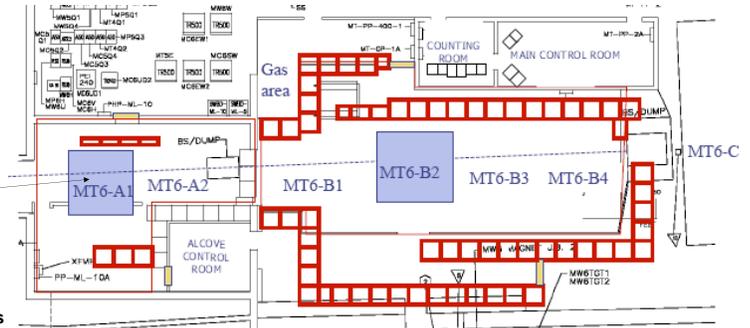
- Later BTeV beam tests used a small aperture hybrid silicon pixel telescope instrumented with FPIX1 ASICs and the BTeV bench test DAQ system.

- This pixel telescope has also been used for beam tests of CMS forward pixel detectors.

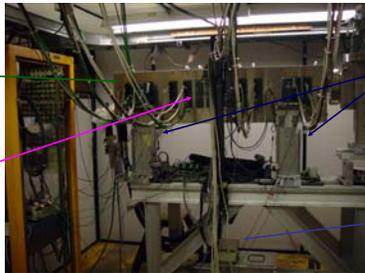
Climate Controlled Hut



Moveable Test Stand



Temperature is stable to within ~1 degree C per week.

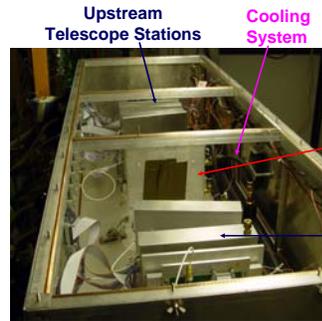


Moveable Pixel Box

Feed Through Boards

Remotely Controlled x-y Positioners

Chiller



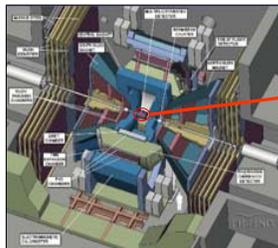
Upstream Telescope Stations

Cooling System

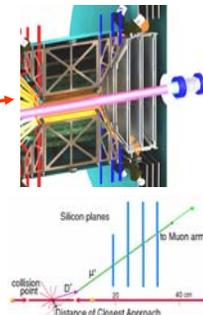
Device Under Test

Downstream Telescope Stations

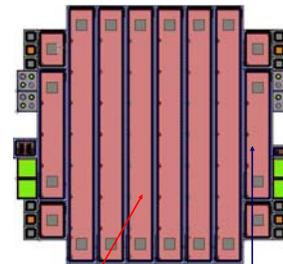
Hybrid pixel detector



PHENIX (at RHIC)



Wafer contains 6 "1x8" and 2 "1x4" sensors



1x8 will be used by PHENIX

1x4 will be used for test beam

New test beam telescope



Half-plane = three 1x4 modules read out by 1 FPGA



Station = two half-planes offset by active area of sensor



2 stations upstream of DUT & 2 downstream (precision x & precision y)