



ATLAS HGTD

Ultra Fast Silicon Detector test beam at SLAC ESTB

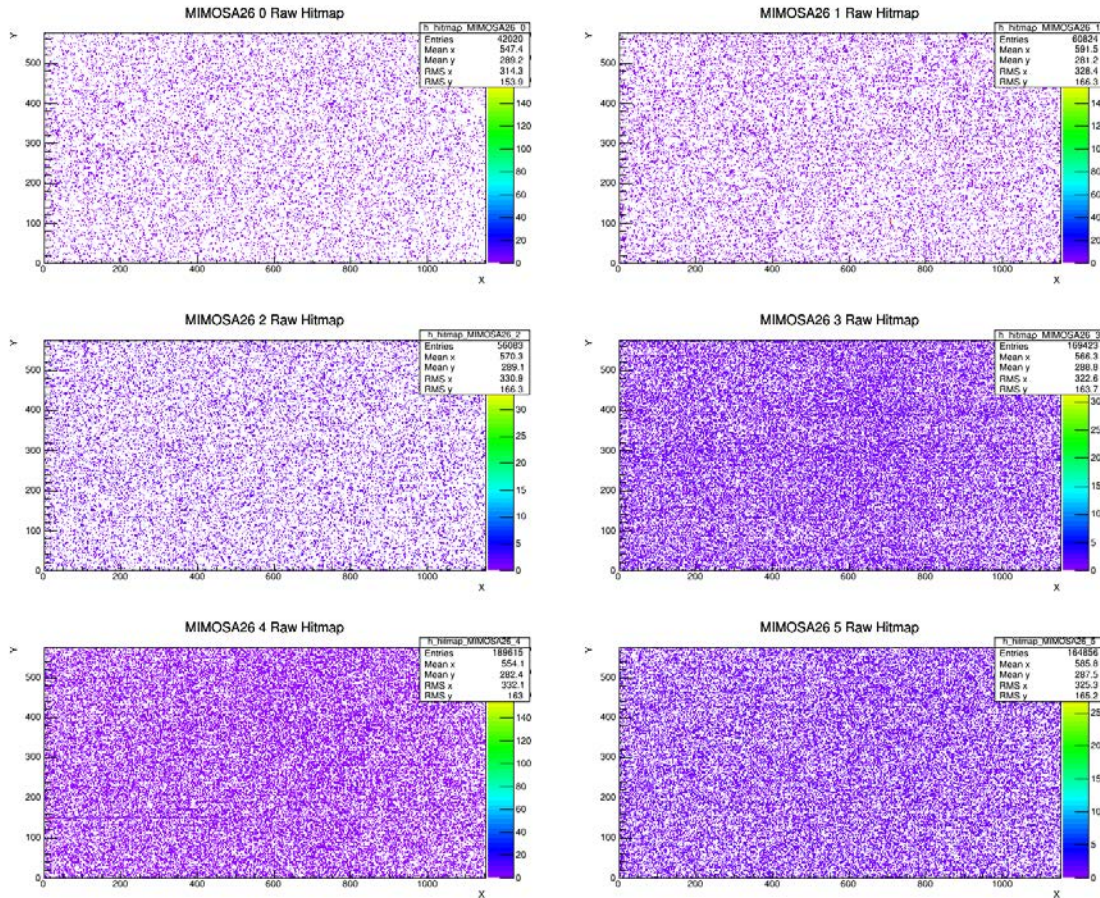
Simone M. Mazza, Y. Zhao, Ric Rodriguez, Carolyn Gee, Ben Smithers,
Su Dong, Ariel Scharzmann, Hartmut Sadrozinski, Abe Seiden, Bruce Schumm

Run status

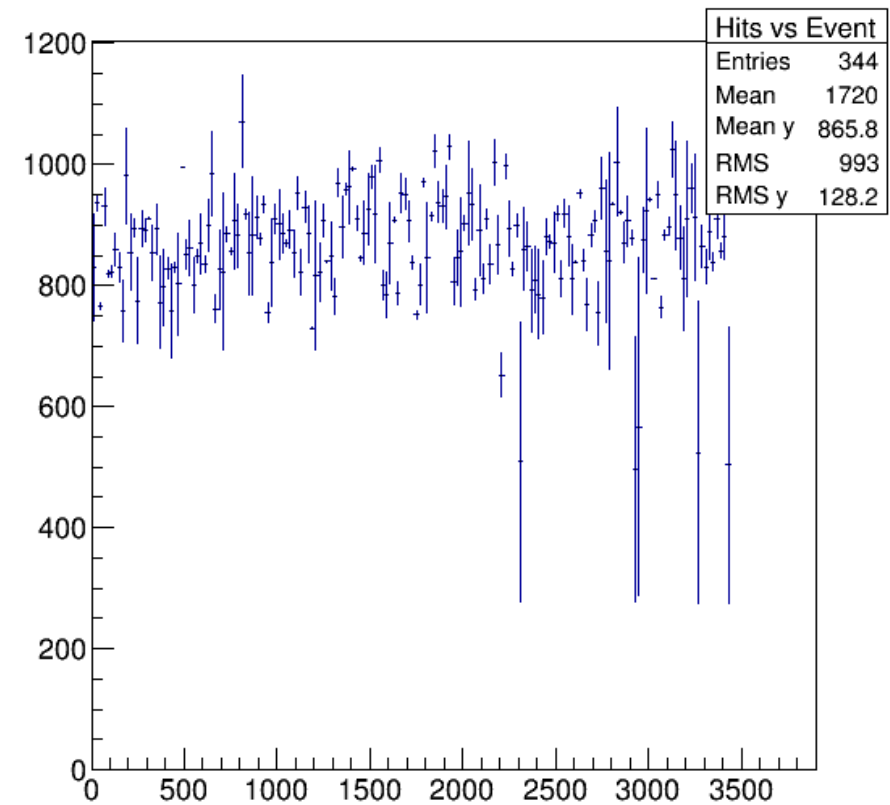
- Steady beam from 9am to 9pm, Thursday through Sunday
- Good data from silicon sensors (scope)
- Using caladium telescope for tracking
 - Mimosa DAQ for caladium working fine
 - Working with EU Telescope for the reconstruction
- We tried several beam intensity configuration
 - Once combine tracking and data we can understand what is the optimal intensity for us
- Logbook:
<https://docs.google.com/document/d/1NuXnwSnm66cPGqXEBakCxgtT9oFdJdmasfm30uLelA4/edit?usp=sharing>

Caladium telescope

Caladium 6 plane hitmap



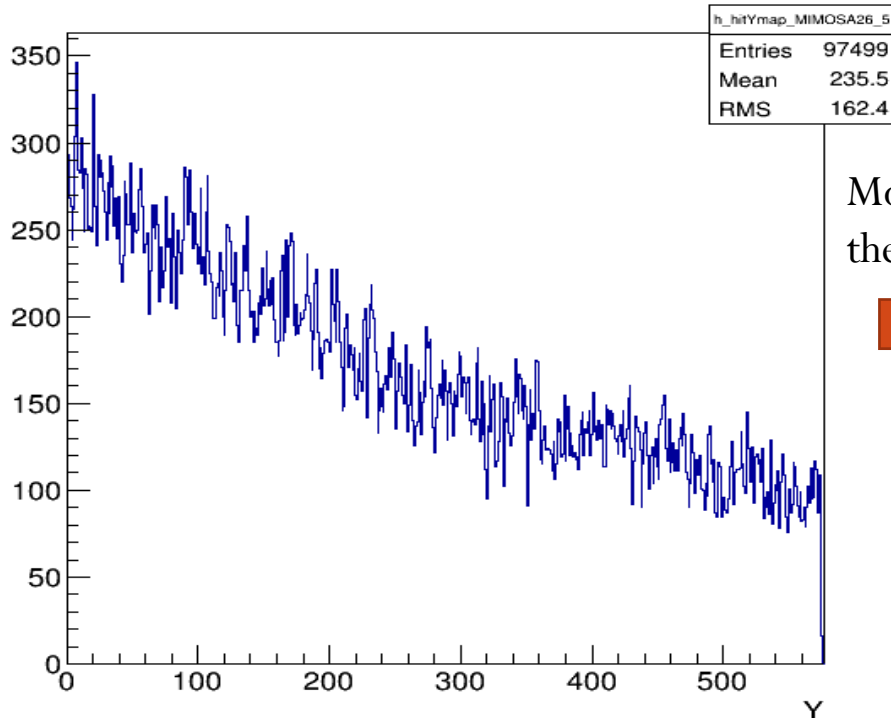
Hits vs Event



Caladium beam finding

With an high intensity setting we can find the center of the beam

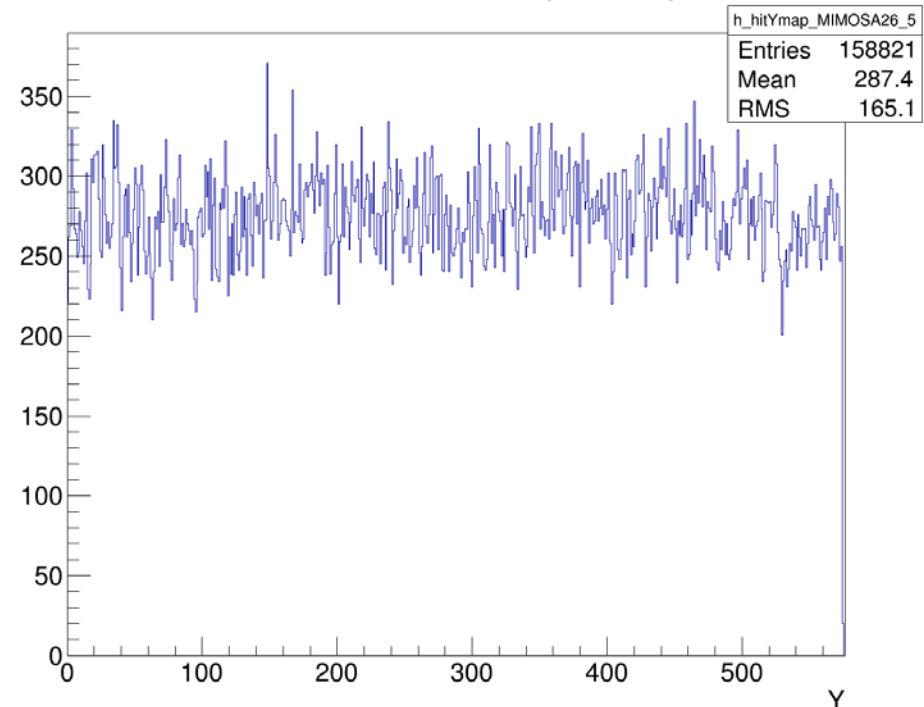
MIMOSA26 5 Raw Hitmap Y-Projection



Moving down
the telescope



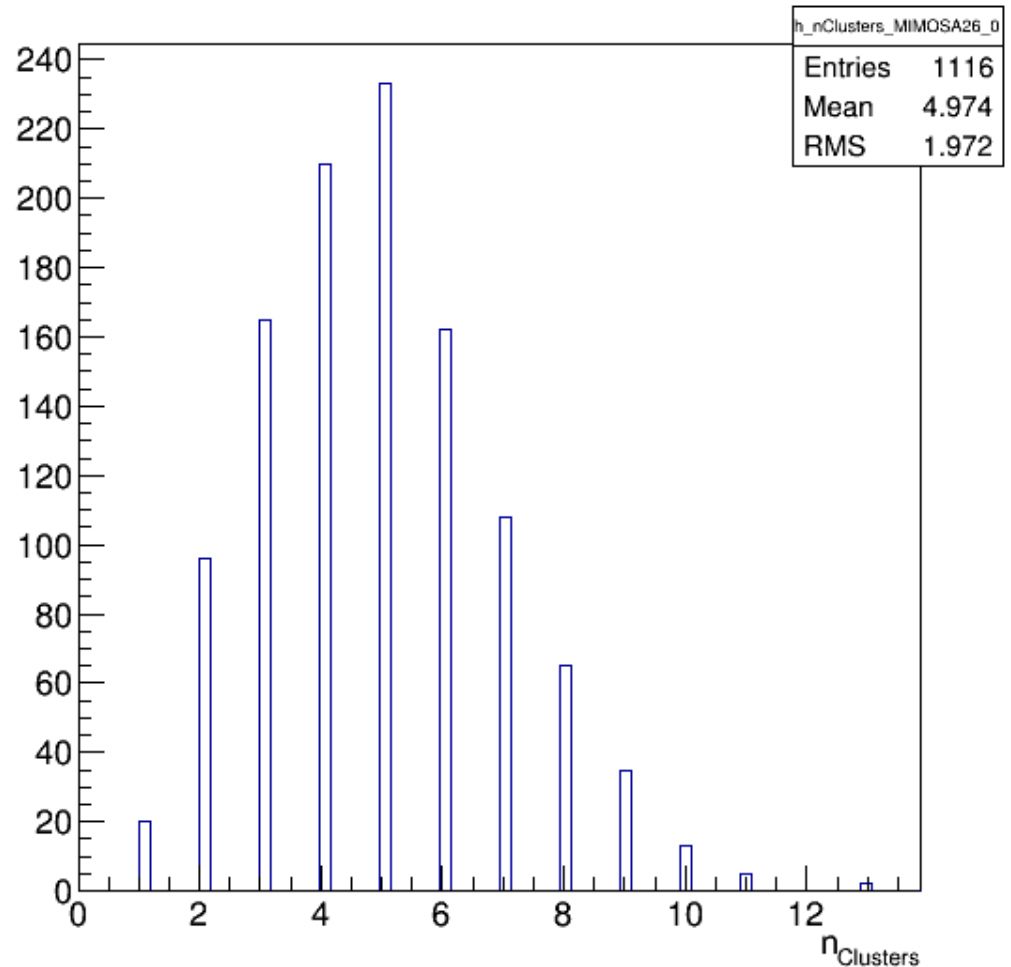
MIMOSA26 5 Raw Hitmap Y-Projection



Caladium number of clusters

- Number of cluster on the first plane of the caladium
- Rough estimate of the number of electrons
- 250 Hits/events means $\sim 4-5$ electrons per beam (maybe?)
- After looking at the reconstruction we'll see if we have to push lower

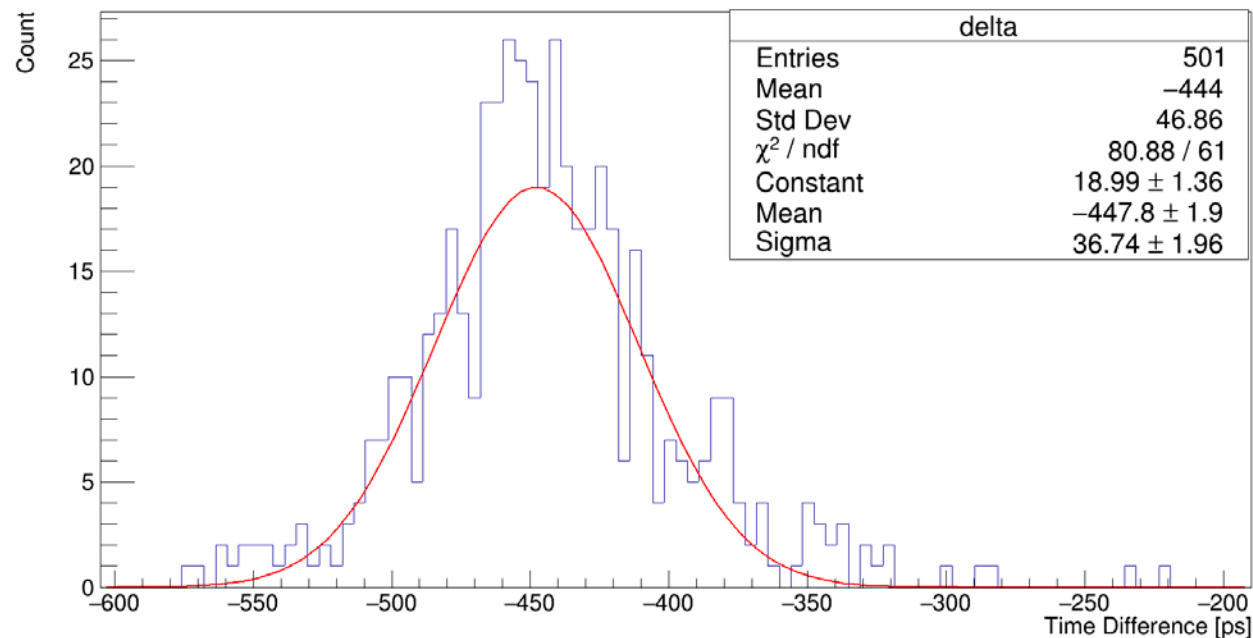
MIMOSA26 0 Number of Clusters



Time resolution

- Time resolution is the same that we see in UCSC
- Looking at the coincidence hit of two detectors with time resolution of CNM LG (35ps) and HPK II type D (15ps)

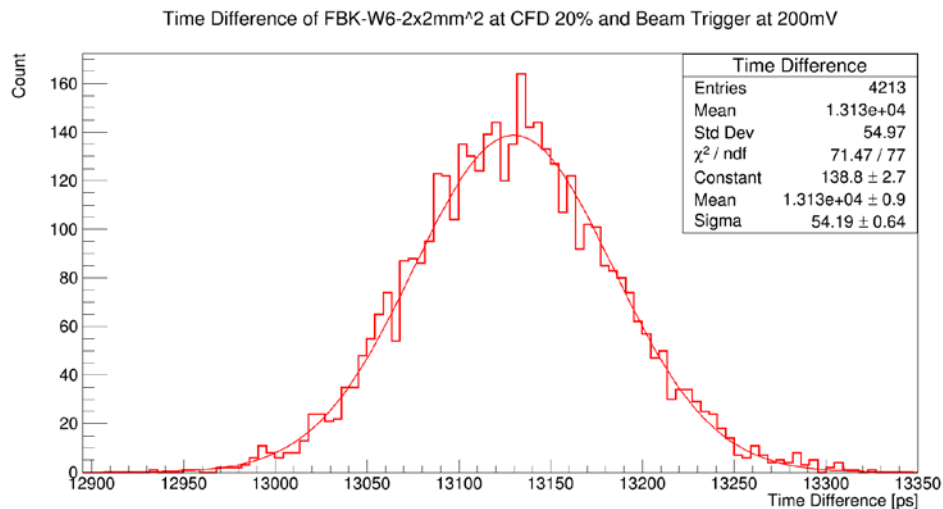
CFD Time difference of HPK type D and CNM LGA33



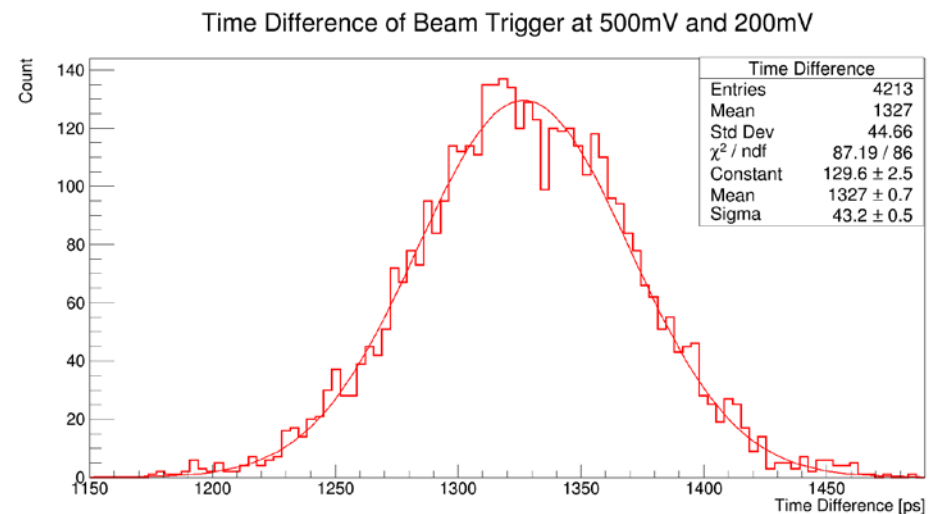
Time resolution: beam trigger

- Time resolution of the beam trigger looks okay: $\sim 40\text{-}50$ ps
 - Looking at ToA 200 mV
 - Testing beam trigger with itself 200 mV vs 500 mV (probe jitter only)
 - Time scale of the scope has to be high, a lot of jitter
 - Next time we'll try with an attenuator

Time resolution sensor vs beam



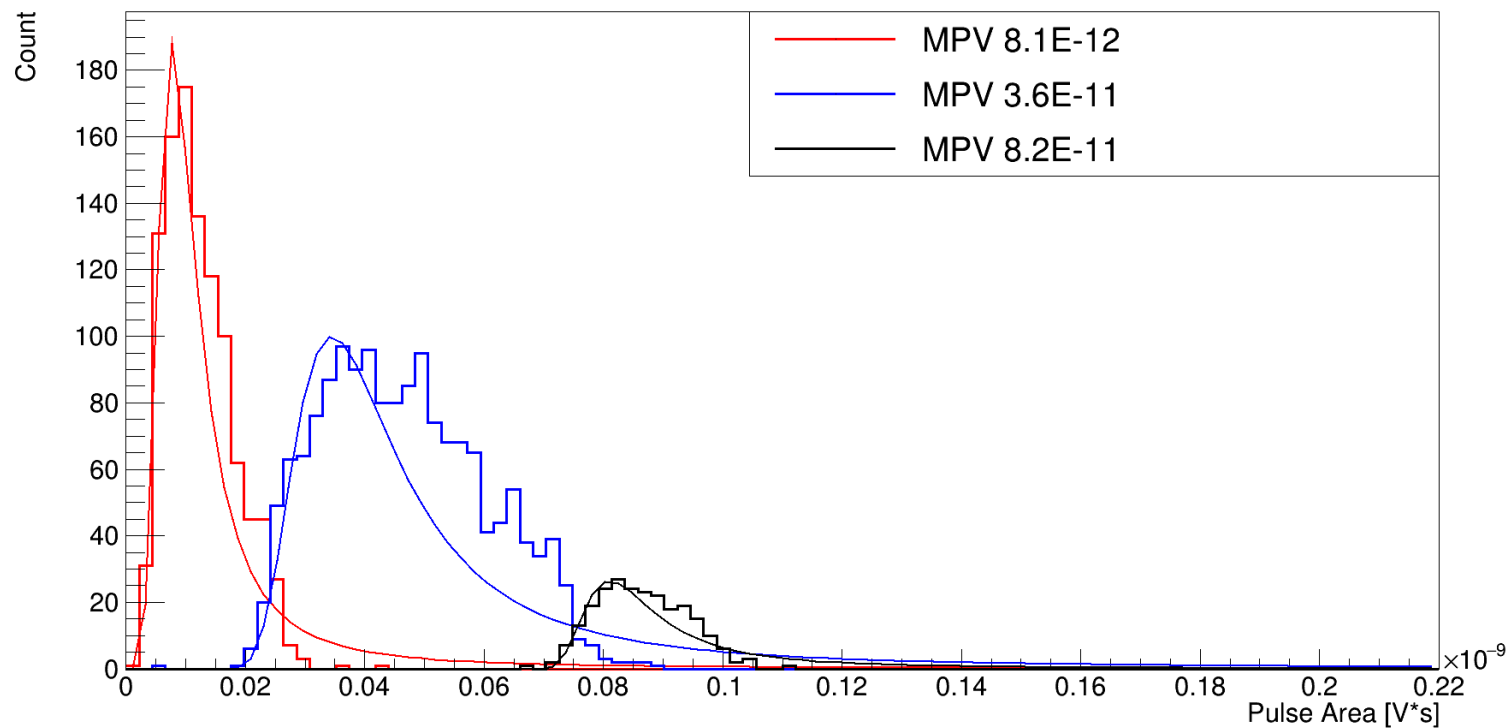
Time resolution beam vs beam



MPV

- MPV of sensors: 1 e-, 2 e-, 3e- (then we see amp saturation)
- $\sim 1\text{k}$ Hits/events (now we run 200-300 Hits/events)

HPK type D Pulse Area



List of sensor tested

- HPK II type D
- FBK W6 (2x2 mm)
- CNM LG A (run 9088)
- HPK II Type B35
- CNM RB 2x1 array (KU board)
- 4ch board with HPK 80C
- 4ch board with CNM AC W6
- HPK III sample G
- CNM RA 2x1 array (KU board)