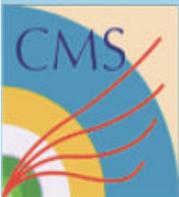




Fermilab Facilities Readiness for HPK Campaign

**Selcuk Cihangir, Simon Kwan, Ilya
Osipenkov, Lenny Spiegel, Ping Tan,
Zongru Wan, Andriy Zatserklyaniy**



Silicon Detector Center (SiDet)



- Multiple interconnected buildings bringing together physicists, engineers, drafters and technicians to work on semi-conductor based detectors

Run II, CMS TOB and FPix, Dark Energy Survey, SNAP

- Experienced core team dating back to the first CDF vertex detector

- Two large clean rooms

200 and 300 m²

Inner 25 m² class 100 room planned

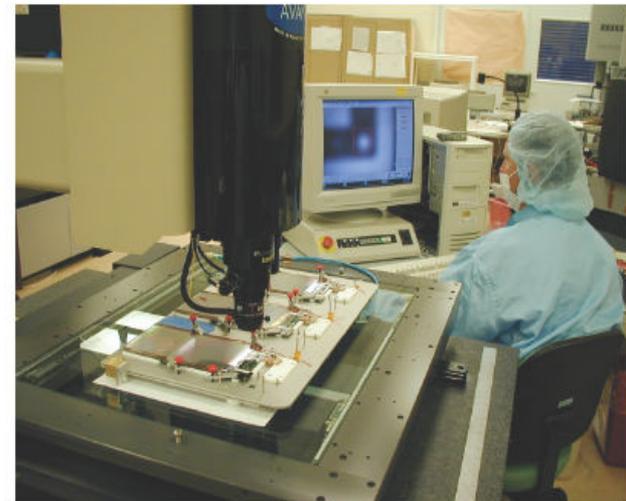
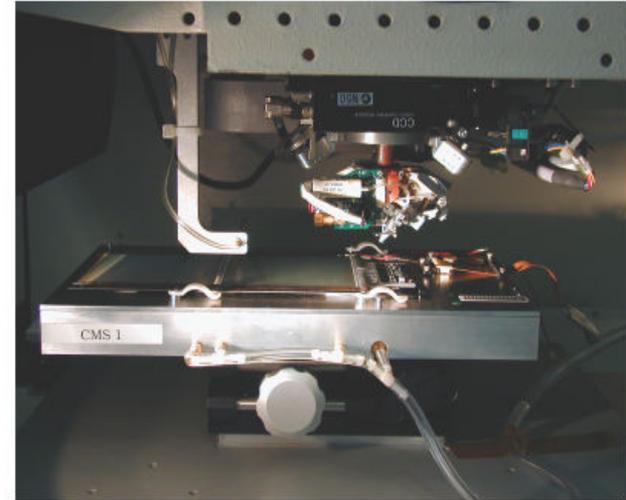
Should be largely available for S-LHC R&D and production



SiDet Resources

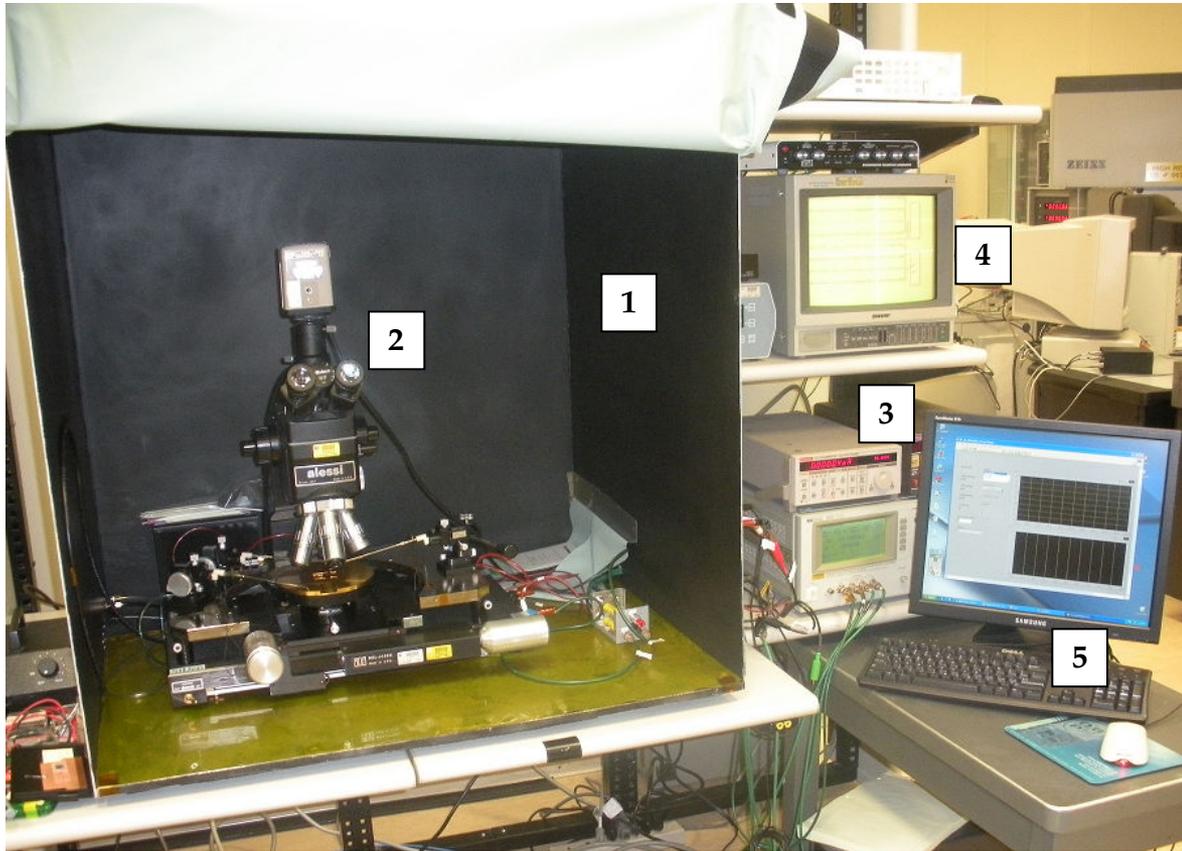


- Coordinate Measuring Machines
Brown&Sharpe, Cordax, LK, Zeiss (15 machines in total)
Two 3-meter long machines
- Bonding lab
 - 3 K&S 8090
 - 3 K&S 1478
 - 1 K&S 4523 (deep head)
 - 2 DAGE pull testers
- OGP Avant 600 optical system
- Design Systems M8A flip chip bonder
- Probe stations
- DISCO dicing saw
- ID glue dispenser and other misc. laboratory equipment





Manual Probe Station

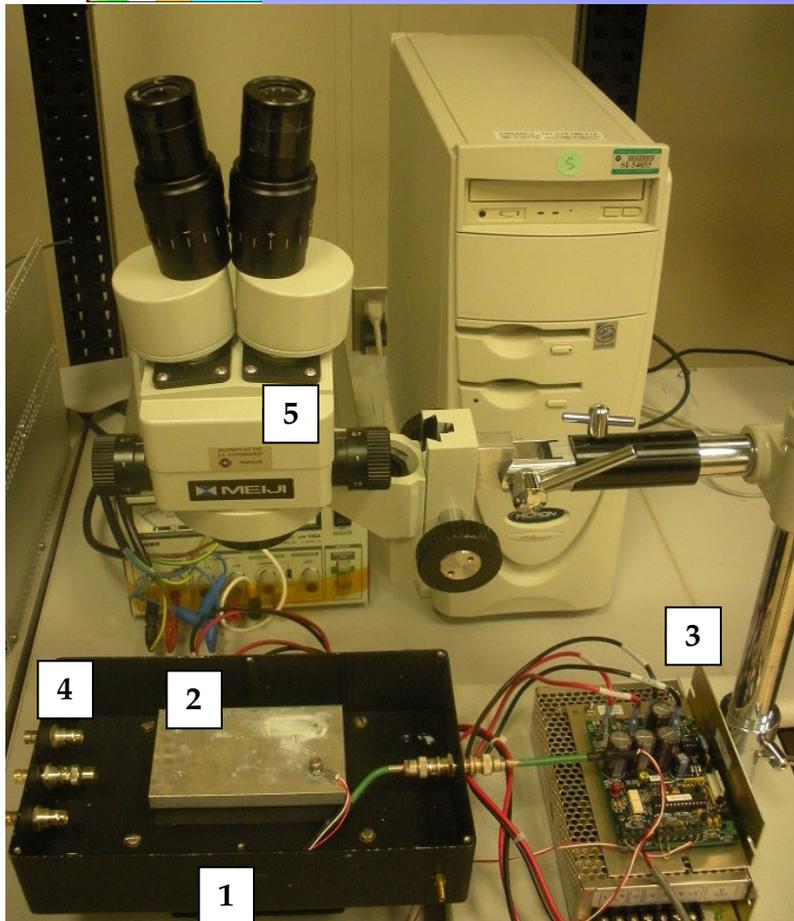


- 1 Dark Box
- 2 Probing Microscope
- 3 C,V,I, R Measuring Equipment
- 4 Monitoring TV
- 5 PC-LabView Program

We also have two semi-automatic probe stations

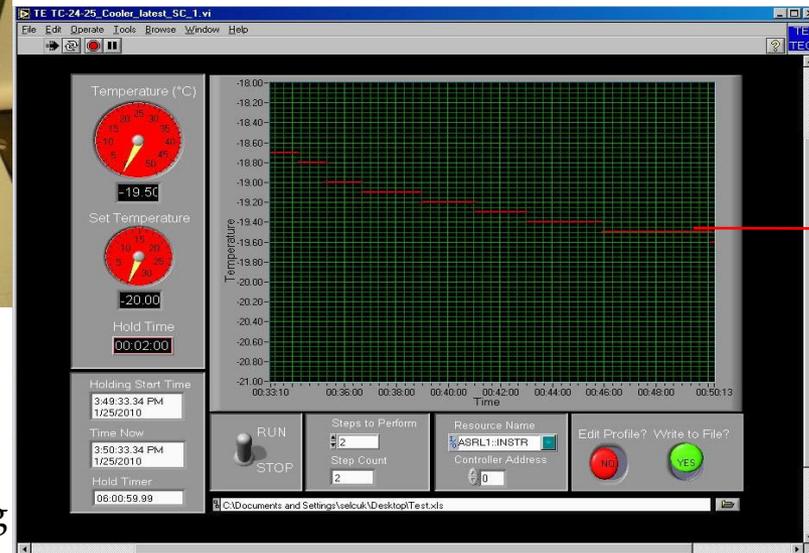


Cooling Chuck



Stand Alone Cover and the probes not shown

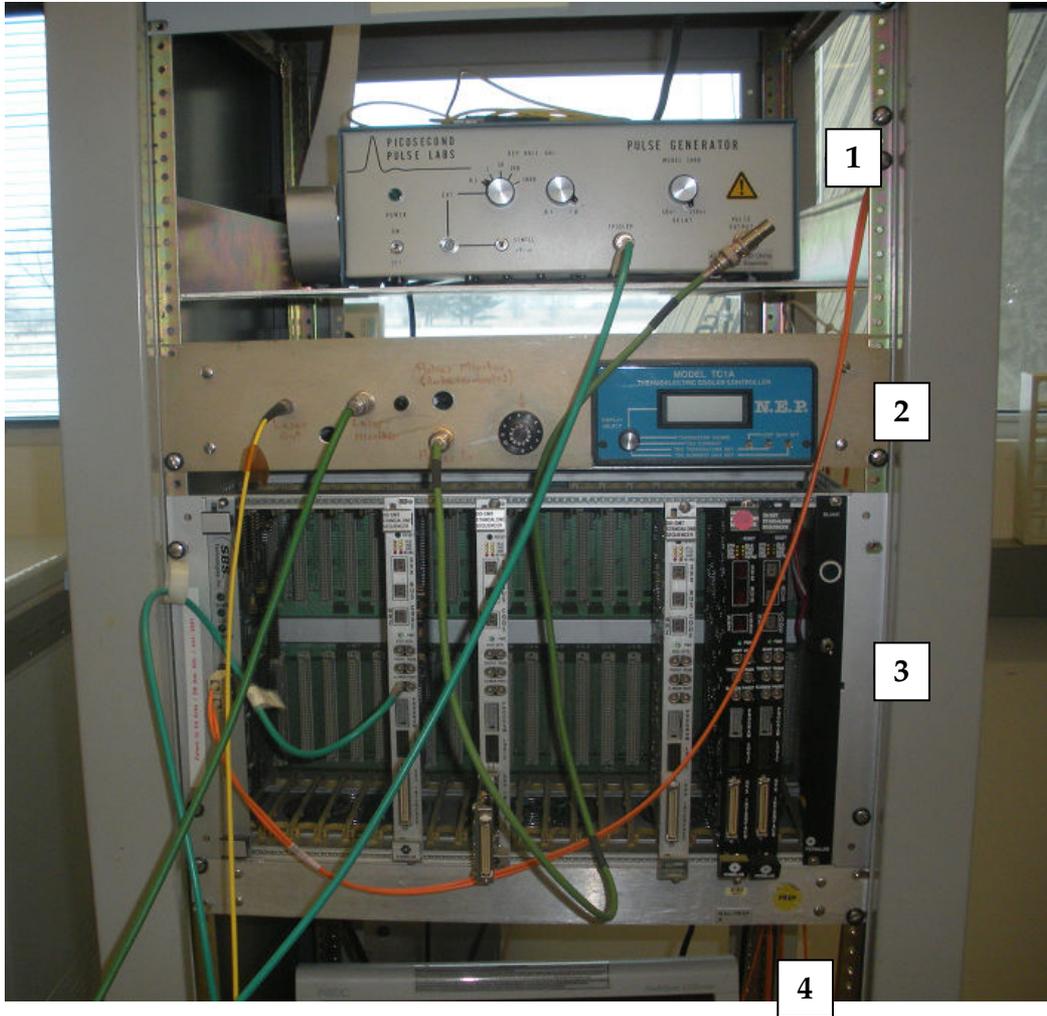
- 1 Dark Box with N₂/Dry Air flow
- 2 4"x6" Peltier Cooled (under the box) Chuck, RTD mounted
- 3 Peltier and PC Control Electronics
- 4 Signal cabling interface
- 5 Microscope



LabView Control and Monitoring



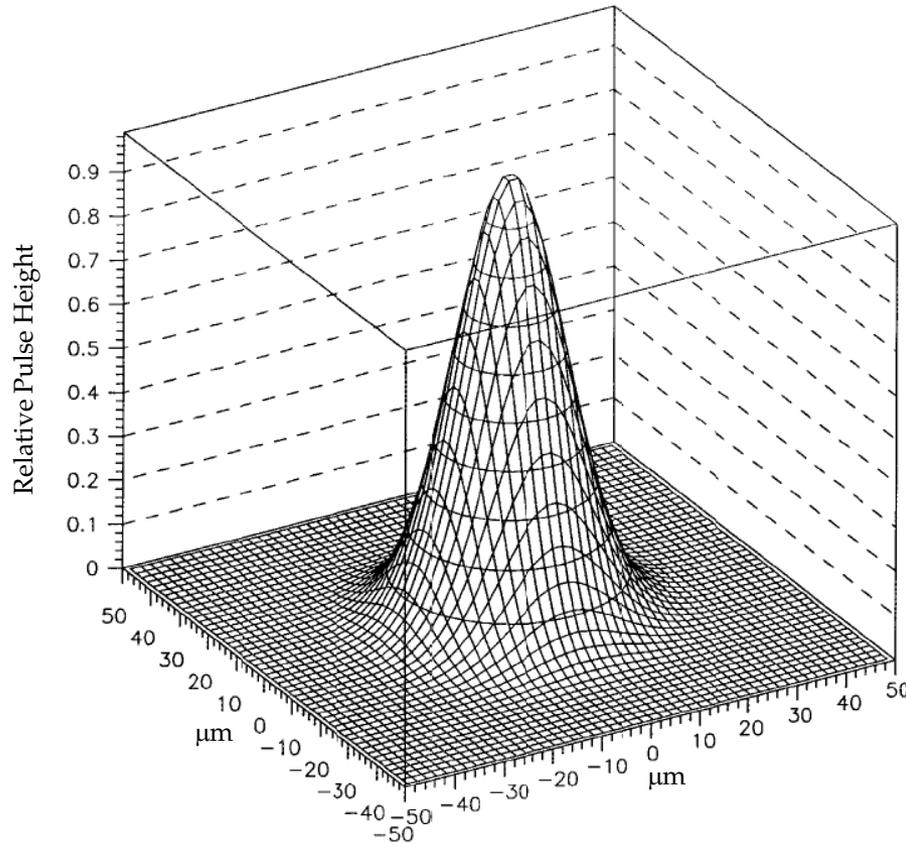
Laser Setup



- 1 Laser Pulser
- 2 Box containing Laser Diode, Cooler, Driver, Splitter and Attenuator
- 3 DAQ and Trigger Electronics
- 4 PC with LabView



Laser Source Characteristics



Wavelength: $\sim 1060 \text{ nm}$
Rise Time: $< 1 \text{ ns}$
Spot size: $\sim 10 \mu\text{m}$ -Sigma

Details:

M. Vaz, S. Cihangir, P. Rapidis
Fermilab-TM-1849 (1993)

S. Cihangir, P. Hu

Fermilab-TM-1925 (1995)

We have sources with wavelength
of 580 nm, 630 nm and 950nm.

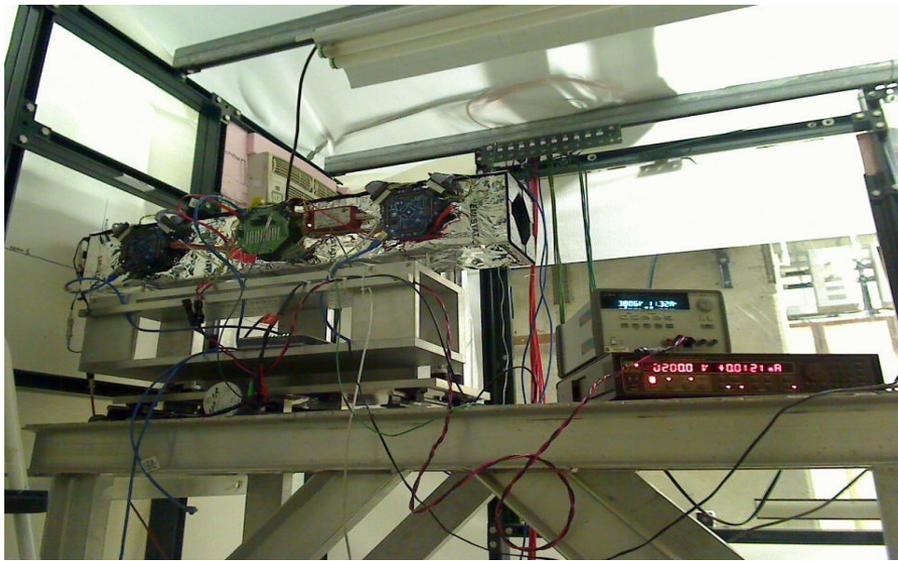
Rendition of laser spot size based on pulse height
observed on a strip detector while laser swept on it.



TEST BEAM AT FERMILAB

- **Test beam available at Fermilab for almost 10 months every year**
- **For details: <http://www-ppd.fnal.gov/MTBF-w/>**
- **Submitted proposal to Fermilab**
- **3 year program to study different sensor materials (planar Si, 3d, diamond ...) before and after irradiation**
- **Approved by Fermilab (T992)**
- **Goals for 1st test (last December):**
 - **commission pixel telescope (part of test beam facility)**
 - **Test single crystal diamond detector (from PLT group; installed currently)**
 - **Test new SINTEF 3d detectors (single chip)**
- **Unfortunately, due to magnet problem, we had only few hours of beam during our slot. Instead we ran parasitically for about a week.**
- **We have another slot for two weeks in 2nd half of March**

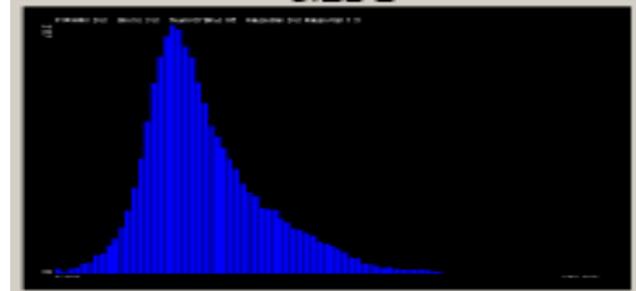
Rivera, Turqueti, Uplegger, Prosser, Lei



The telescope is made of grade B modules rejected during the CMS forward pixel production. The modules we are using didn't pass the High Voltage requirements

We used 2 different kind of modules made of 6 (2x3) and 8 (2x4) readout chips (ROCs). The overlap area between modules is about $2 \times 2 \text{ cm}^2$.

Telescope has 4 stations. Each station has a Y-measuring module and a x-measuring module



Raw pulse height distribution for the telescope planes