LGAD Consortium Detector Projects and Interests

February 3rd 2021

https://indico.bnl.gov/event/10704/

https://cern.zoom.us/j/61420417115?pwd=ZUh5elJsdTQvQWdNbFE3b1h4RVMwdz09

BROOKHAVEN NATIONAL LABORATORY

U.S. DEPARTMENT OF ENERGY

1) EIC Project Interests

1) TOF, thin LGAD tech development to push down the timing resolution below 30ps. Limited effort in fabrication, however small areas are possible. Testing of sensors

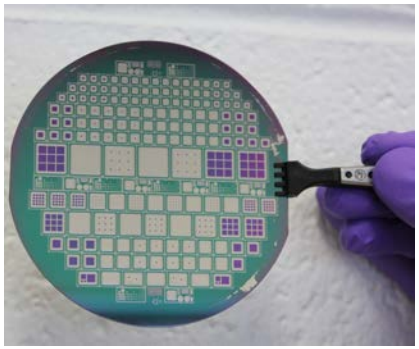
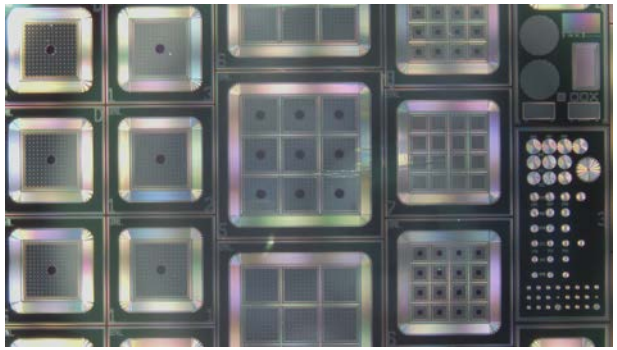
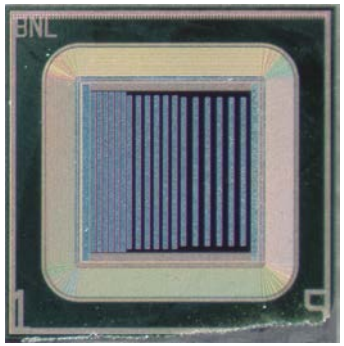
2) Roman Pots: building the whole detector , starting from the sensors (area below $1m^2$)

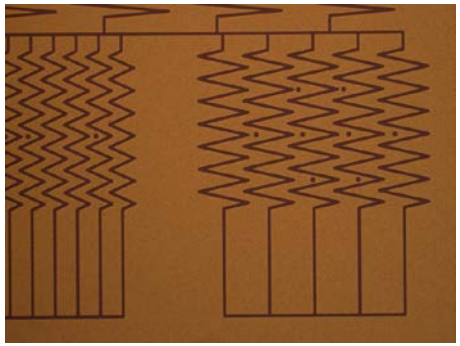
In general, we have interest in 4D detectors.
Fabrication of LGADs is limited to below $1m^2$, but we can run qualification tests on devices.

2) Activities, Expertise and Person power

LGAD sensor R&D: fabrication in class-100 clean room dedicated only to silicon sensors (we are fabricating DC/AC-LGAD and other LGAD flavors)

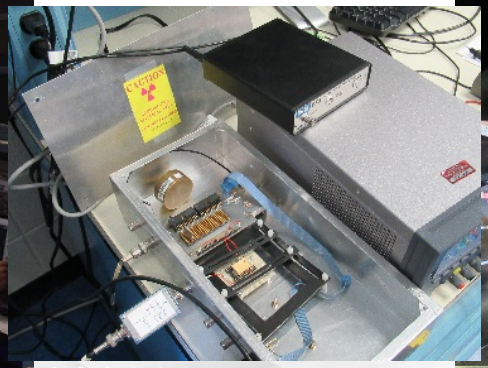
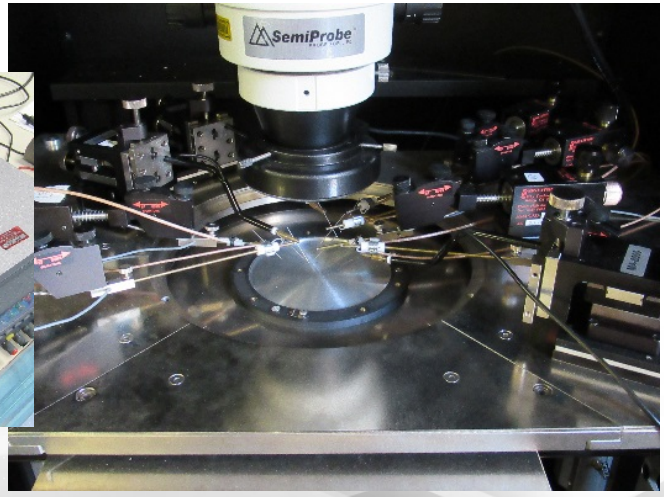
- 1 scientist, 1 process engineer, 1 technician



Sensor or electronics testing: lab dedicated to silicon sensor testing

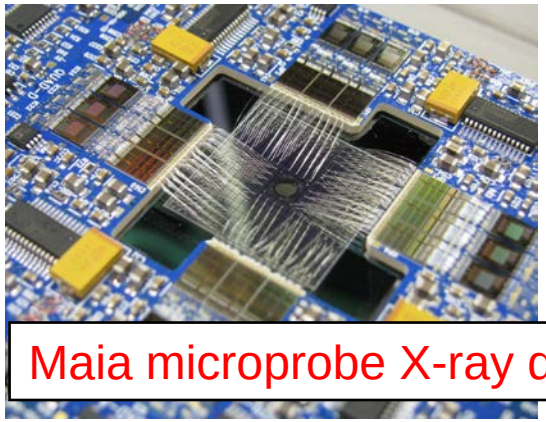
- 1 research Associate

3) Equipment available

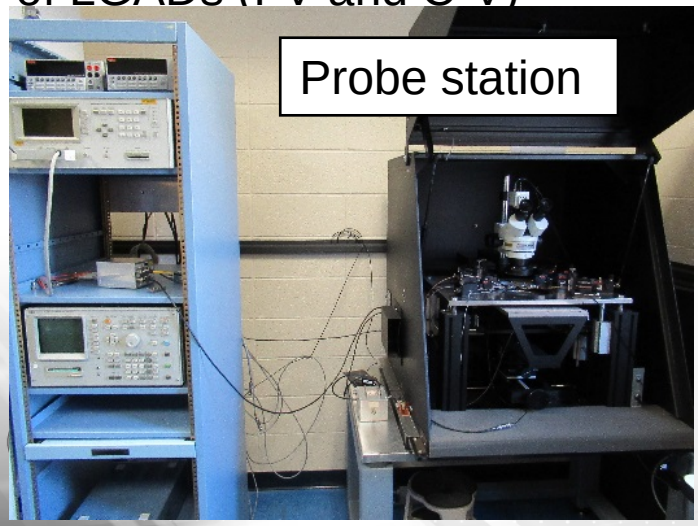
- Class-100 clean room for complete silicon sensor fabrication: up to 1m^2 should be feasible.

- Interconnection lab for wire bonding, bump bonding possibly ready by the start of the project



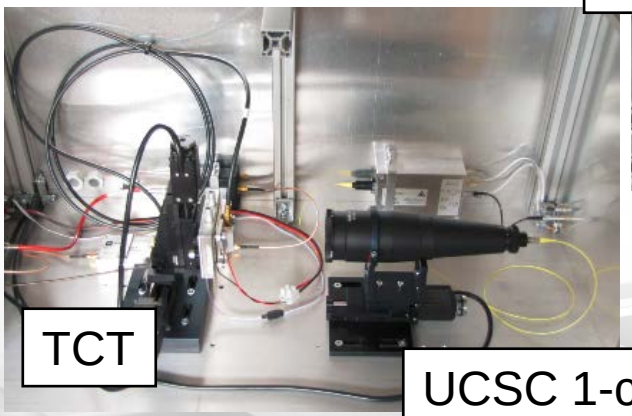
Maia microprobe X-ray detector

- Probe Stations for static measurements of LGADs (I-V and C-V)

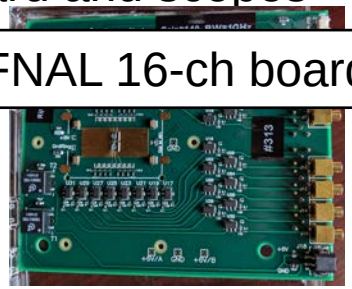


Probe station

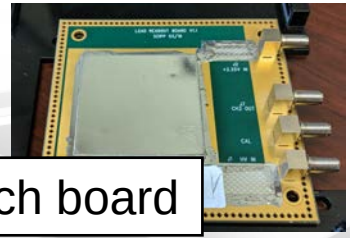
- Testing lab with radiative sources, IR and red TCT, fast board and scopes



TCT



FNAL 16-ch board

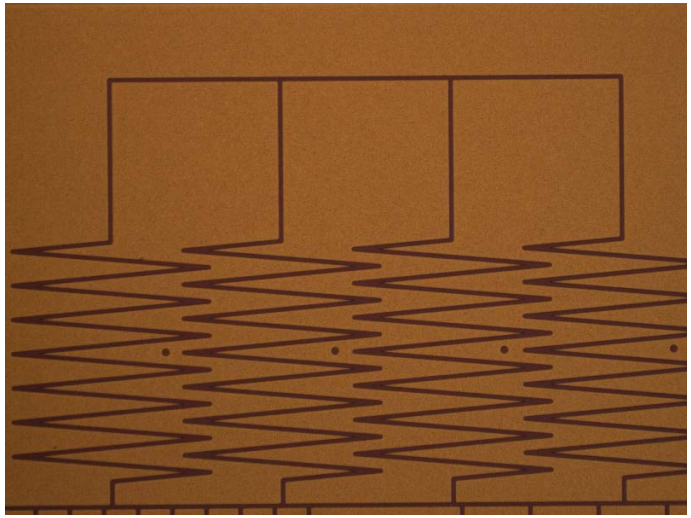


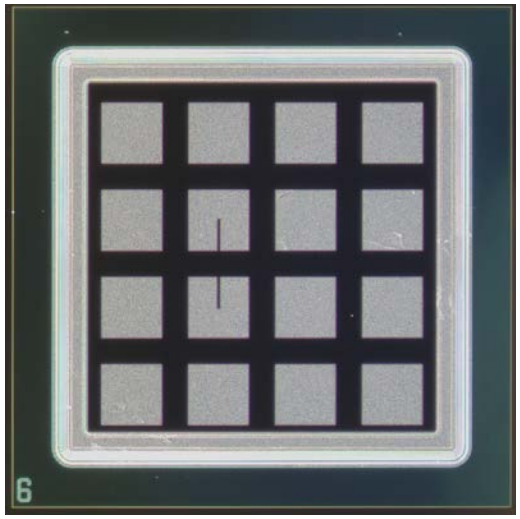
UCSC 1-ch board

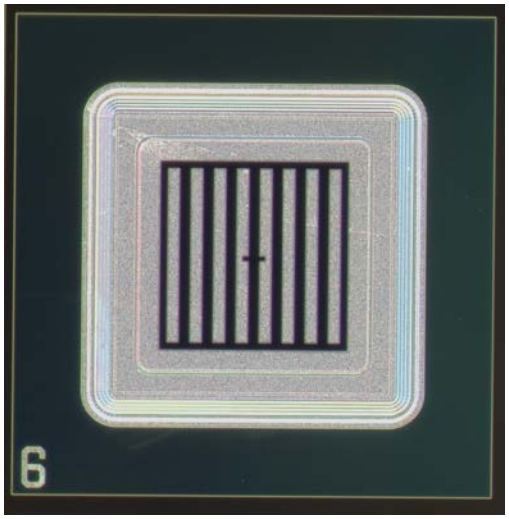
Highlights

Fabrication and tests of LGADs, AC-LGADs and other LGAD flavors for 4D detection (in collaboration with FNAL, Santa Cruz, Cactus Materials Inc).

- Currently AC-LGAD fabrication with revised process, with devices for EIC.
- Larger devices to test yield, reduced Guard Ring termination region.



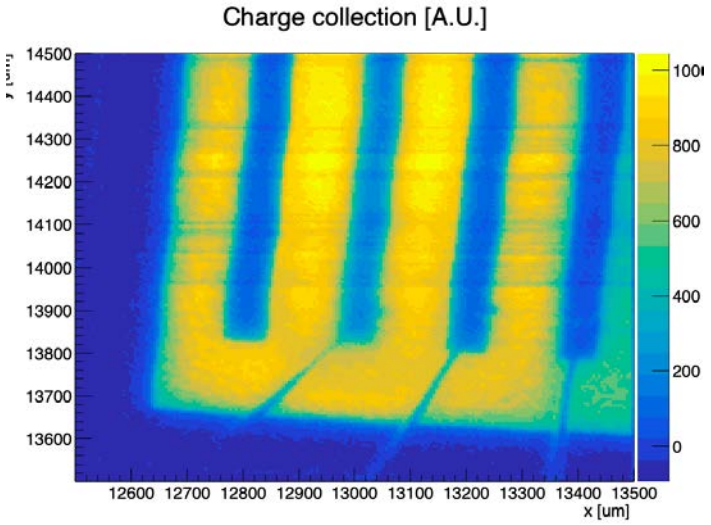




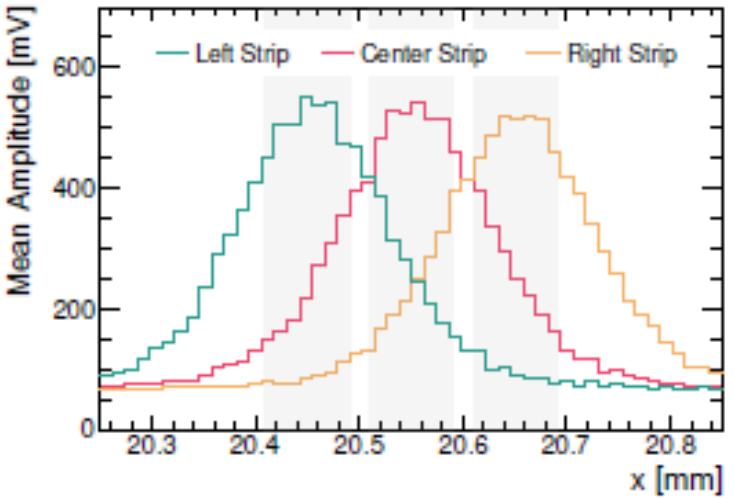
We are eager to distribute our sensors to the community.
If interested, just reach us out

Characterization (besides I-V and C-V)

TCT



Test beam @ FNAL



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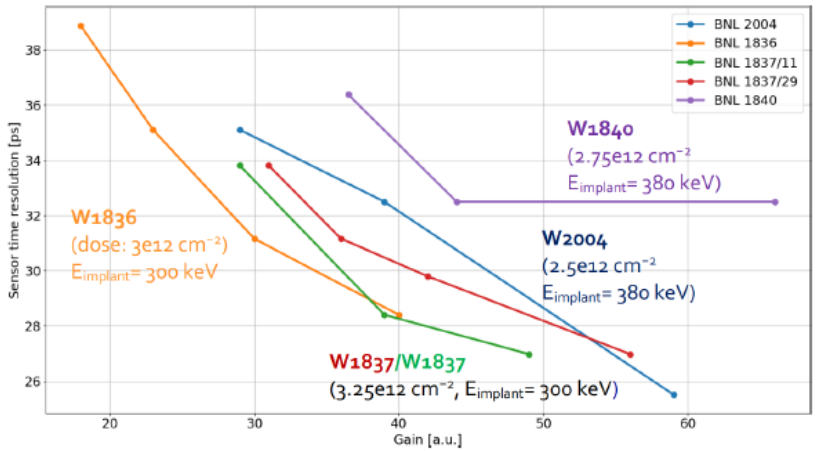
Timing resolution



Gain