

LANL report and FY23 plan for eRD112

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team

Los Alamos National Laboratory

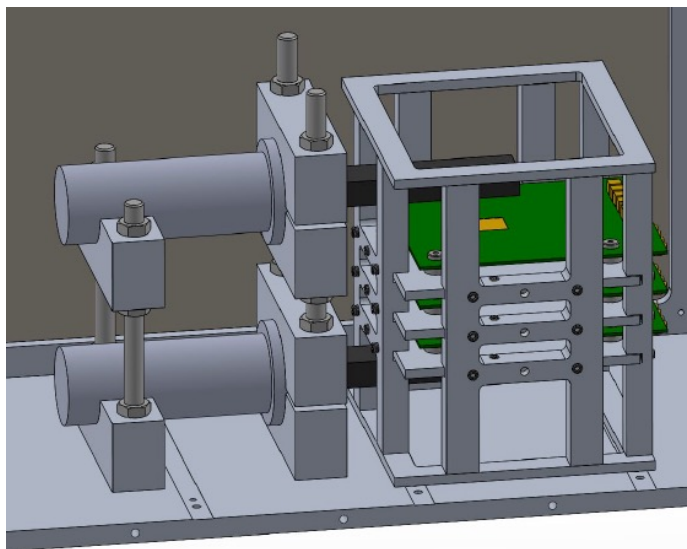
LGAD/AC-LGAD test overview at LANL

- Single sensor with 16-CH carrier board ^{90}Sr source tests.
- Telescope set up and ^{90}Sr source tests.
- Radiation hardness tests with the LANL LANSCE facility.

AC-LGAD single sensor test setup

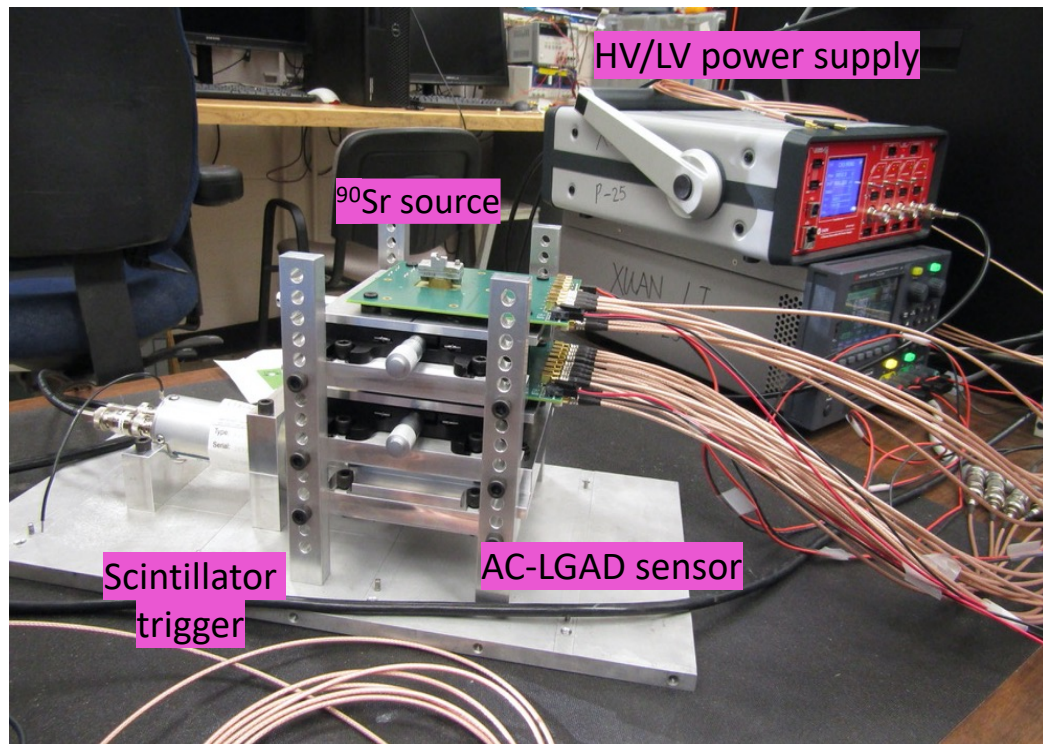
- With the newly assembly mechanical structure designed and assembled.

Mechanical design of 3-layer LGAD (AC-LGAD) telescope



Special thank UCSC colleagues for providing the LGAD/AC-LGAD sensors and wire bounding 16-CH boards.

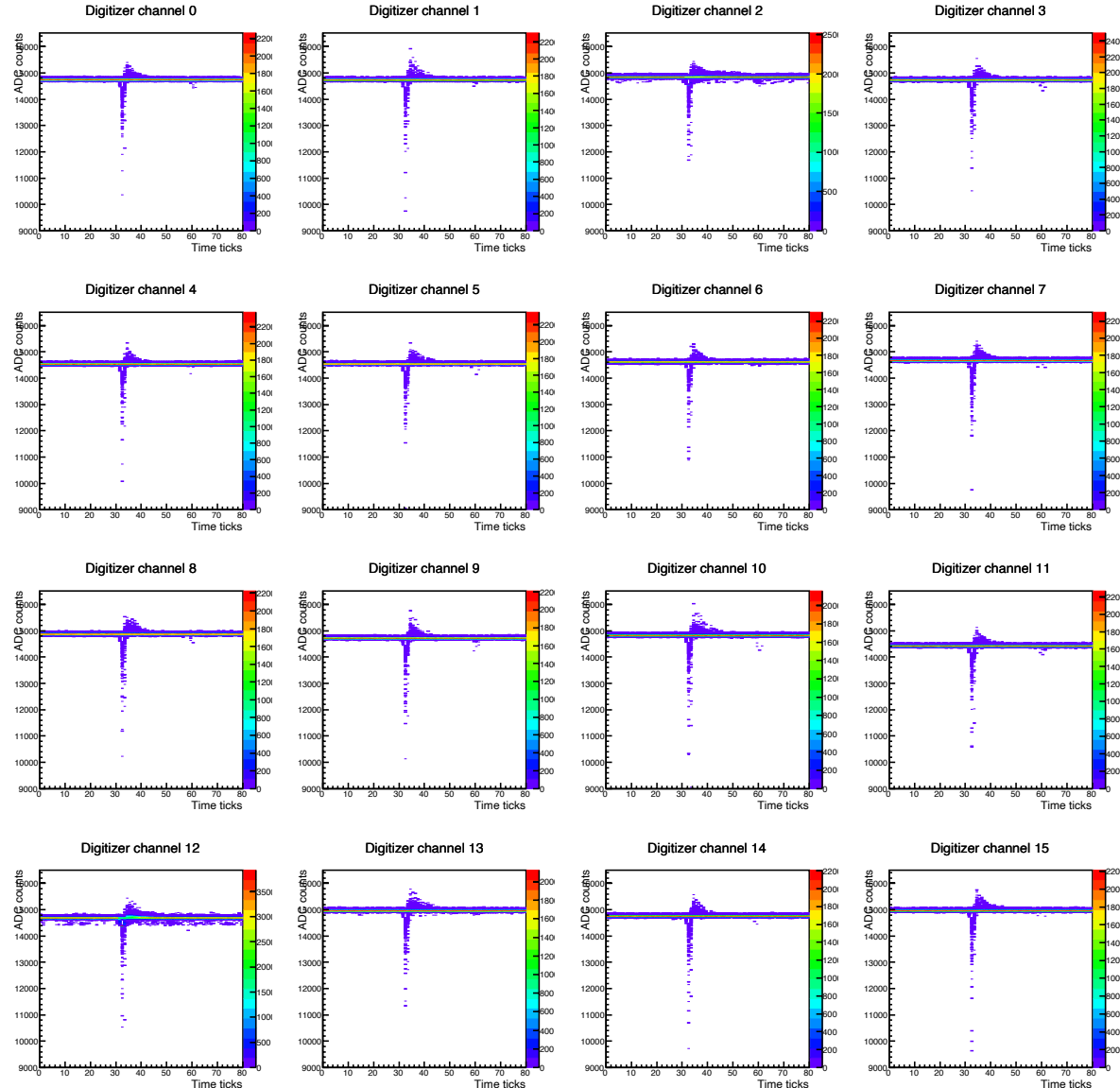
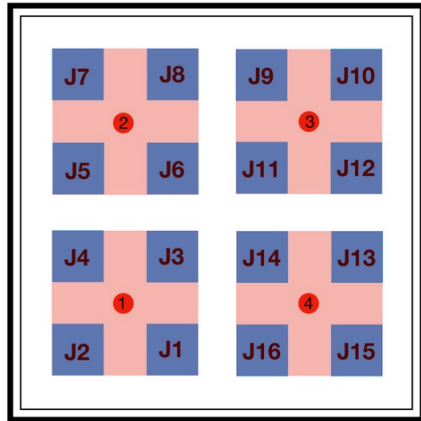
3-layer AC-LGAD telescope ^{90}Sr test setup with 2 sensors connected to the readout



AC-LGAD sensor bench test with a ^{90}Sr source

- Raw ADC distribution using the CAEN 1730s digitizer.

AC-LGAD
pixel map

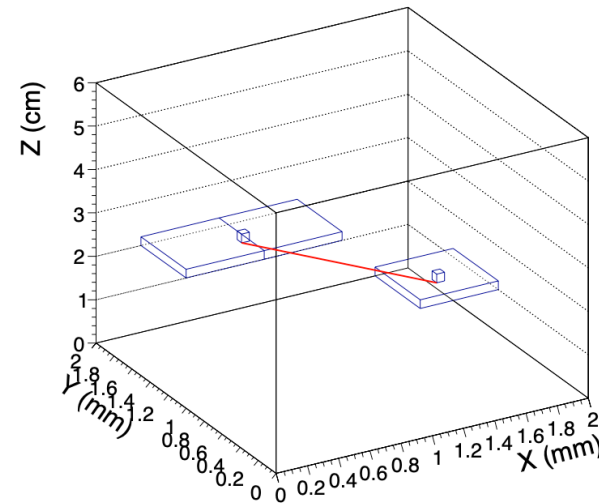


AC-LGAD telescope test

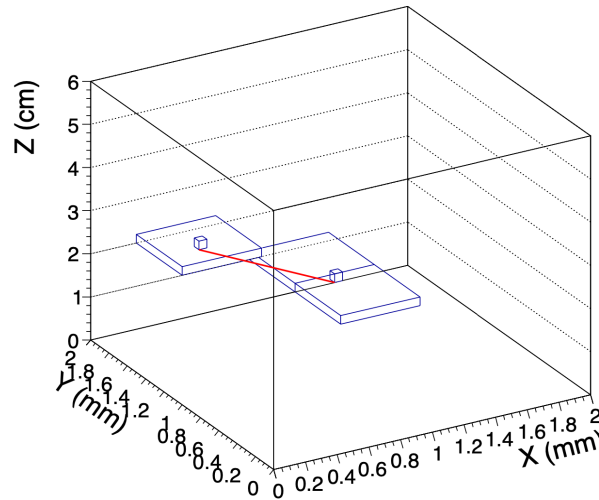
- Feasibility tests of the AC-LGAD telescope using a ^{90}Sr source.

Event display of reconstructed electron tracks

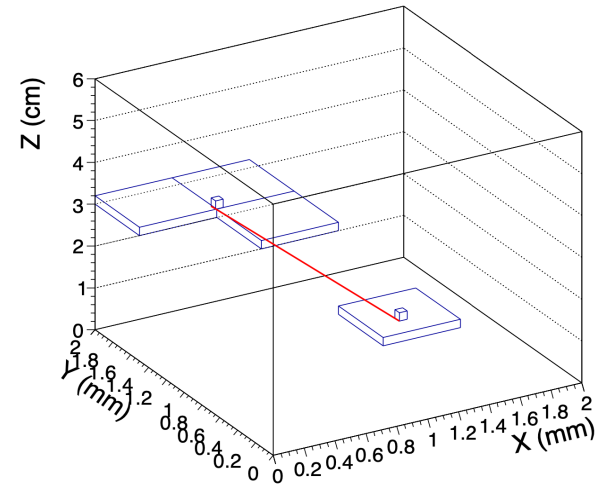
Event display 1



Event display 6



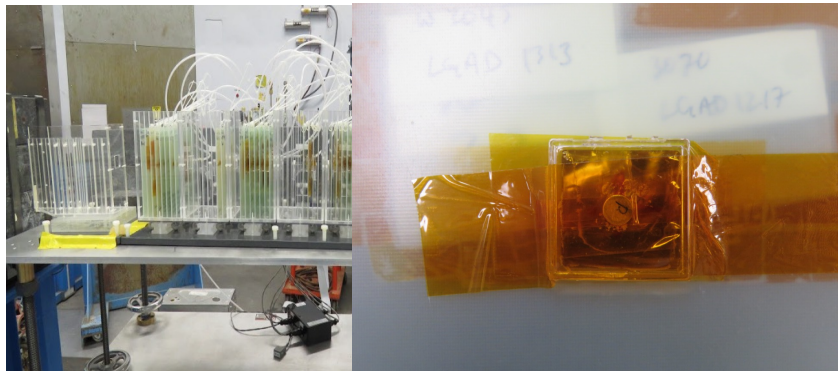
Event display 16



- Tracking performances such as efficiency, spatial and temporal resolutions are under study with the 3-layer telescope configuration.

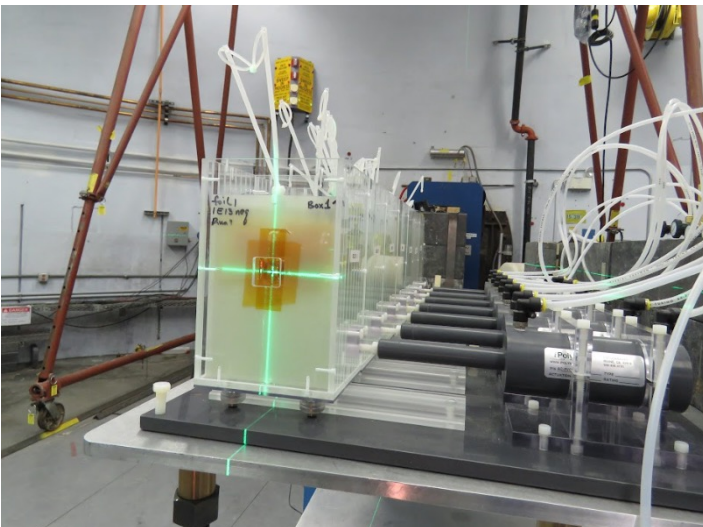
Irradiation tests at LANL LANSCE

- 8 groups of LGAD and AC-LGAD sensors/diodes have been tested at LANL LANSCE with 500 MeV proton beams.
- The radiation doses are from $10^{13}n_{eq}cm^{-2}$ to $10^{16}n_{eq}cm^{-2}$.



working with BNL, UNM colleagues

Carry-Boards	20 um LGADs (3070)	50 um LGADs (3045)	AC-LGADs
1	1217	1313	W1-22
2	1215	1307	W2-15
3	1808	1514	W2-17
4	1807	1915	W2-22
5	1206	1908	W2-29
6	1216	1911	N/A
7	1913	1912	N/A
8	1212	1910	N/A



FY23 LANL plan

- Will work on testing the irradiated LGAD and AC-LGAD samples with the wired bounded 16-CH carrier boards.
- Would like to join future multi-layer telescope beam tests at Fermi lab if schedule allows.
- Will schedule new LANSCE irradiation tests for new AC-LGAD sensors if needed.