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LGAD (AC-LGAD) detector R&D status and plan at LANL

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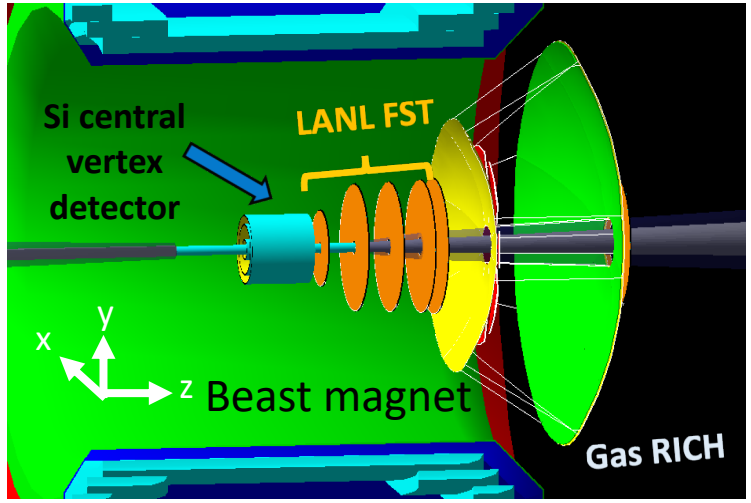
EIC LGAD consortium workshop, Feb. 3rd, 2021

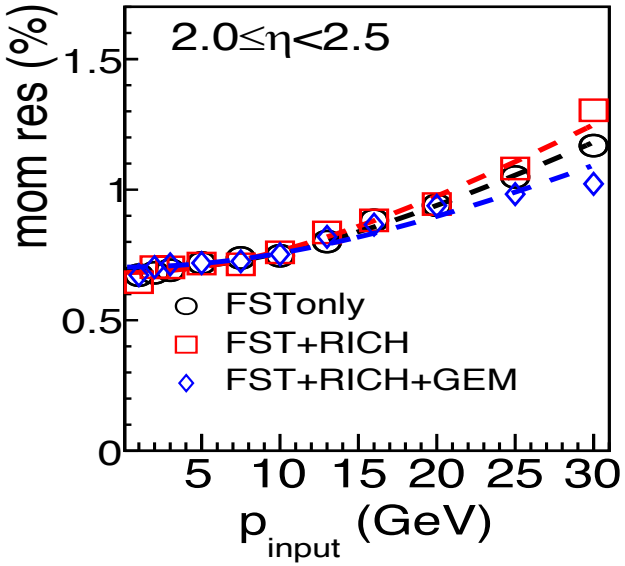
Advanced silicon detectors are essential component for the EIC

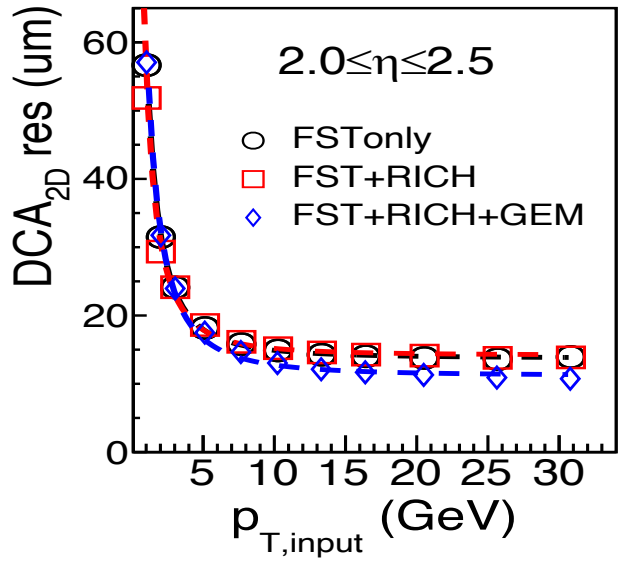
- Initial detector design for a proposed Forward Silicon Tracker (FST) and its performance has been studied.

LANL FST integrated inside the EIC



arXiv:2009.02888



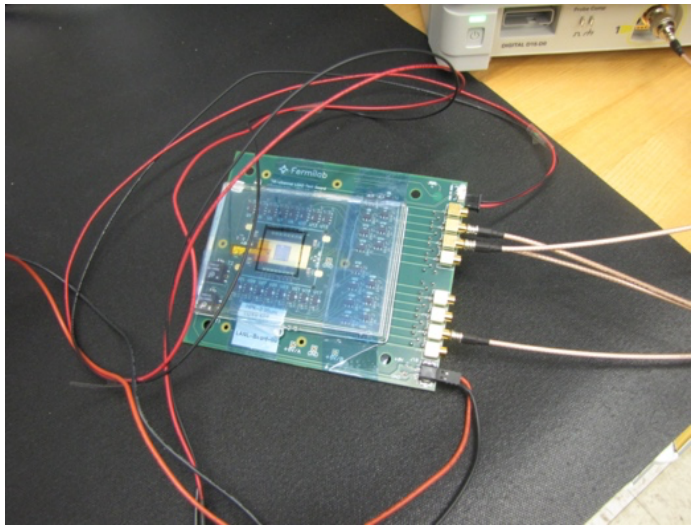


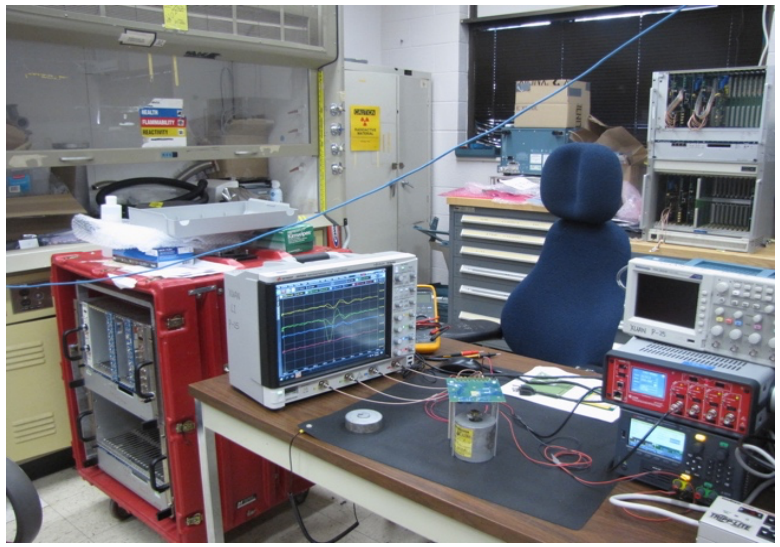
- Based on the expected spatial and temporal resolutions, the LGAD (AC-LGAD) technologies are good candidates for the more-forward silicon planes.
- Work to do:
  - Update the detector design with detailed modules and service parts. Need inputs and suggestions.
  - Integration with the LGAD based ToF.

Relevant Areas of Interests

- Detector R&D and testing underway at LANL.

Single LGAD power and data connection



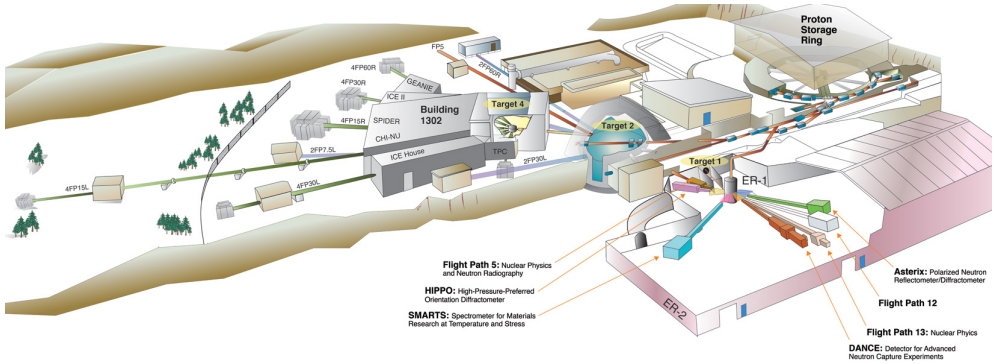


Ongoing R&D at LANL:
Single LGAD Sr90 source test

- Readout developments. For example, DAQ system based on the CAEN V1730S digitizers.
- Detector integration. For example, integration between a forward silicon tracker and a forward ToF detector.
- Mechanical design.

Available equipment and facility at LANL

- LGAD (AC-LGAD) bench test equipment is available at LANL:
  - LV and HV power supplies.
  - NIM modules and crate.
  - CAEN V1730S digitizers and VME crate.
  - MVX cables, power wires and SHV cables.
  - Keysight 2.5 GHZ oscilloscope.
  - Laser scan system.
  - Cooling chiller and environmental chamber.
  - Dry cabinet with temperature and humility control.
  - Large class-100 clean room for assembly.
- LANSCE facility which operation proton and neutron beams with up to 800 MeV energy.

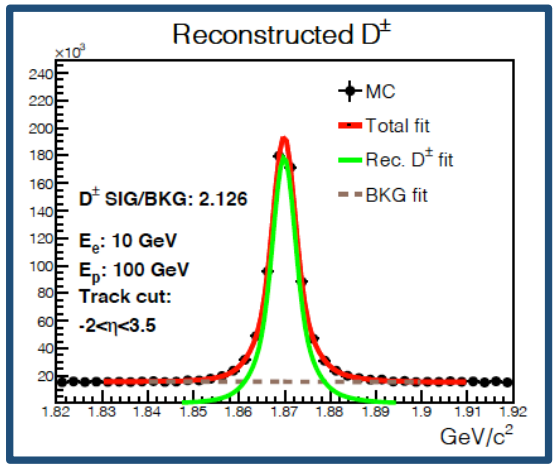


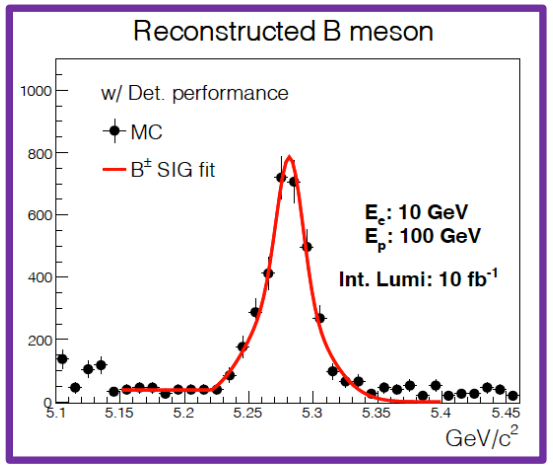
  - User request open on an annual basis.
  - The call for 2021 is open and the deadline is Mar. 5th.
  - We welcome you to join the tests with us.

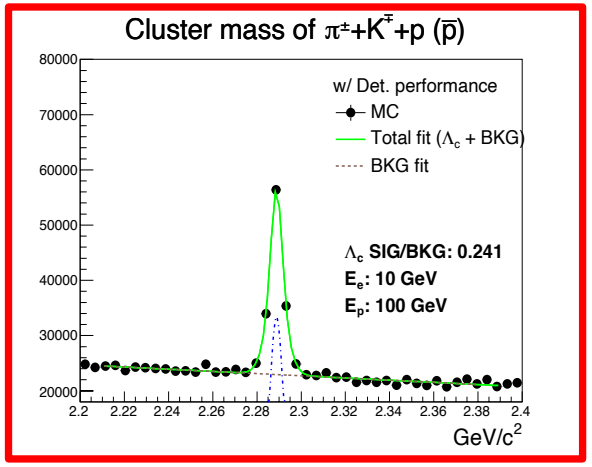
Backup

Reconstructed Heavy Flavor Hadrons at the EIC provide strong discriminating power on hadronization in medium

- Reconstructed HF hadron mass distributions.



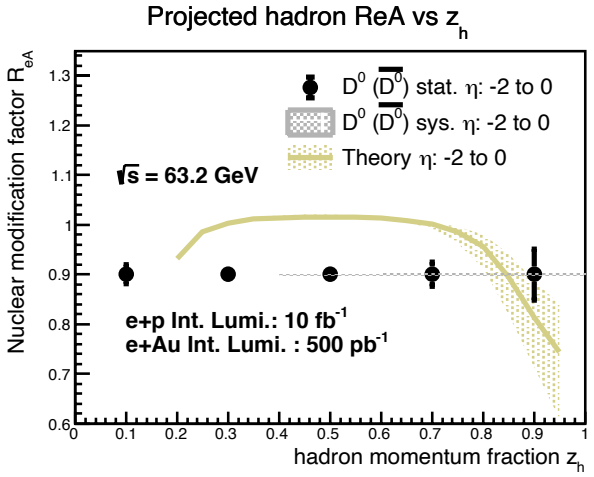


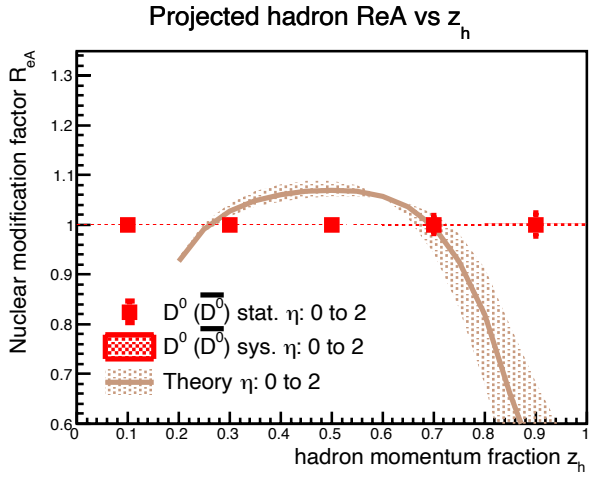


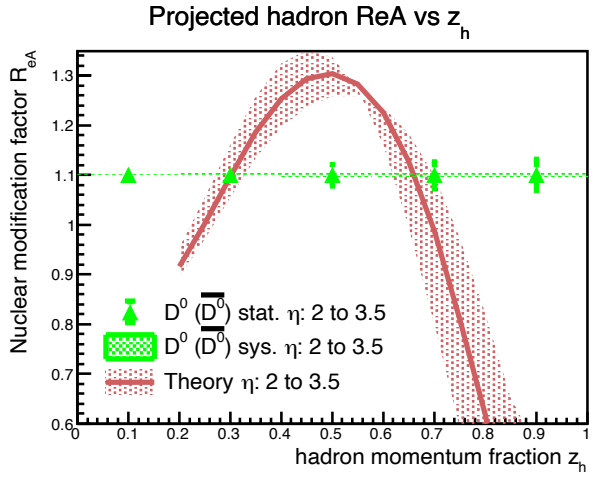
arXiv:2009.02888

- Reconstructed $D^{\pm}$
- Reconstructed $B^{\pm}$
- Reconstructed $\Lambda_c^{\pm}$

z_h dependent R_{eA} for D^0 meson







Theoretical calculations from the HF tomography in EIC, arXiv: 2007.10994