GEM Progress from China

Jianbei Liu

University of Science and Technology of China

SoLID Collaboration Meeting

Jan. 13, 2016

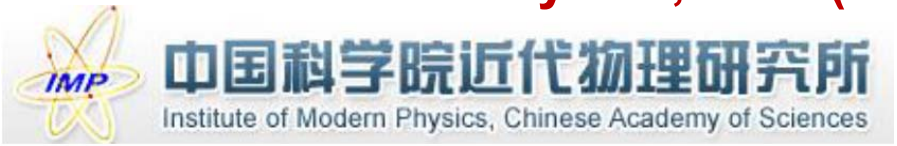
JLab

SoLID-GEM Chinese Collaboration

China Institute of Atomic Energy (CIAE)

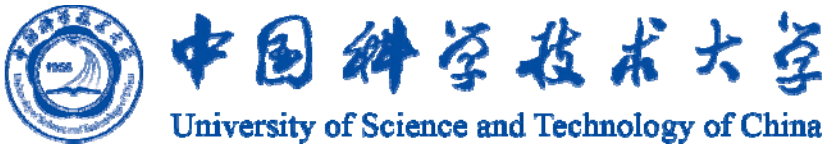
Lanzhou University

Institute of Modern Physics, CAS (IMP)



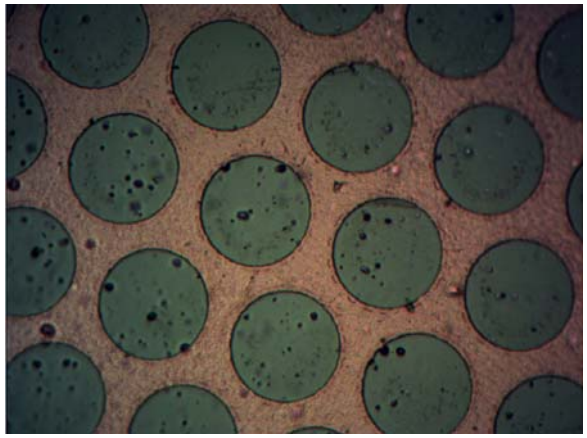
Tsinghua University

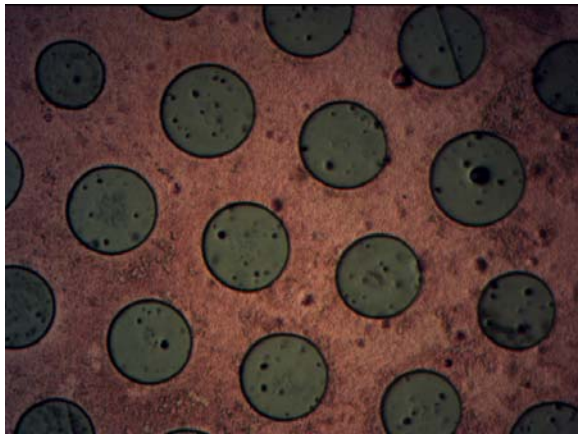
University of Science and Technology of China (USTC)

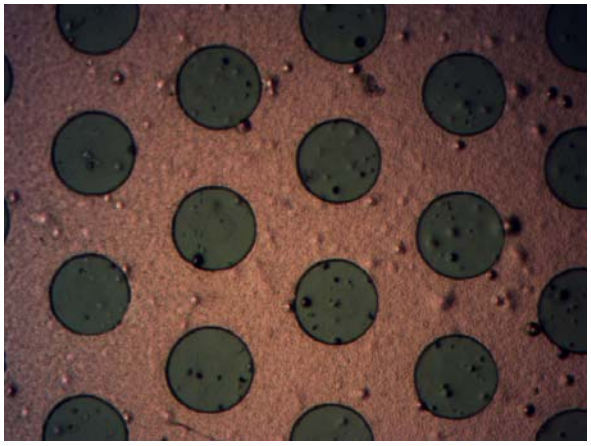


Progress on GEM Foil R&D

- Tested new chemical etching agents. See results below:







CIAE

Continued

- Looking for collaboration with PCB factories

Next to do for GEM foil work

- Upgrade the etching equipment to improve the rate for good quality foils.
- Establish collaboration with PCB factories.
- In the meantime, continue with tests of a prototype GEM detector and APV25 readout electronics.

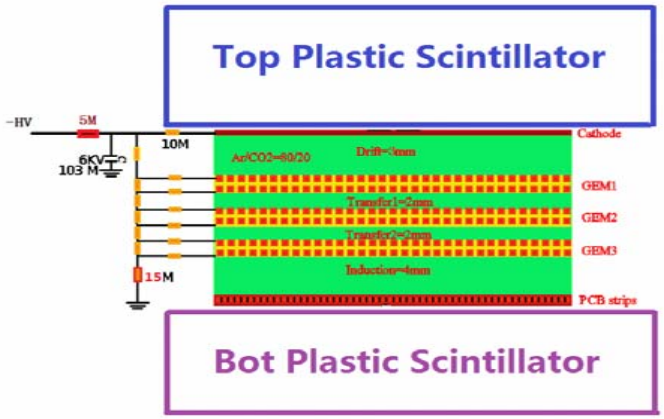
Progress on Readout

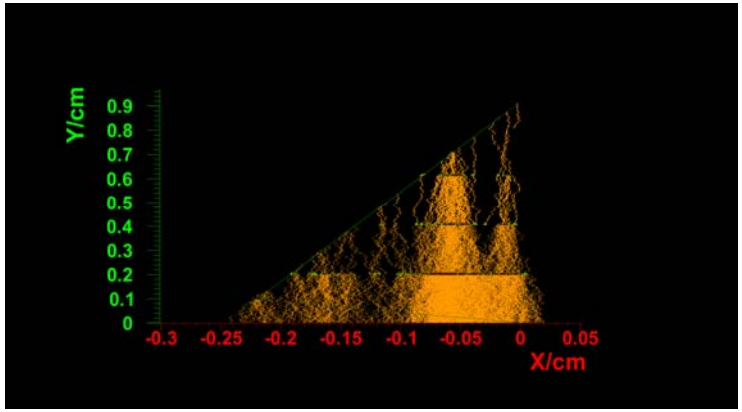
- Aims
  - Reduce GEM local readout rate
  - Reduce data load to DAQ
- Approaches (both to be implemented in FPGA)
  - Utilize GEM signal time features to reject γ background
  - Try hardware-level clustering to reduce event size

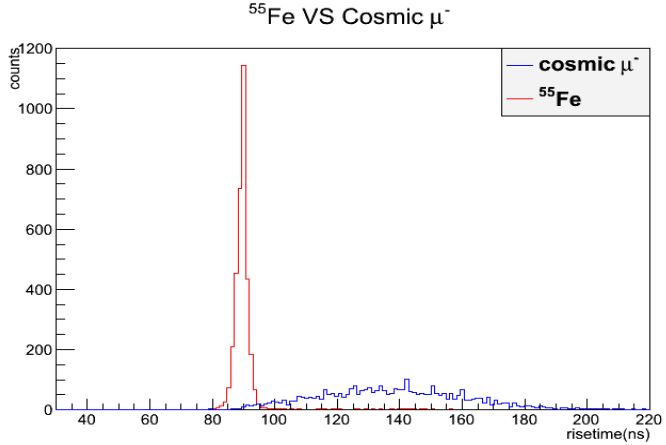
LZU

Time Characteristics of GEM Signals

- Studied time characteristics of GEM signals by both experiments and simulation.

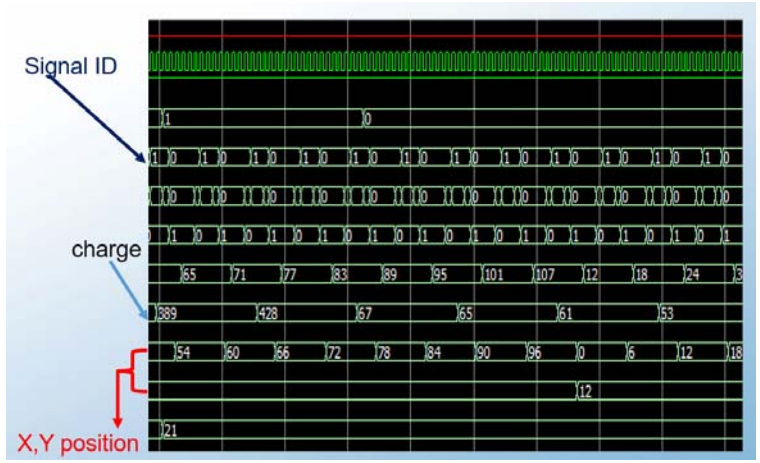






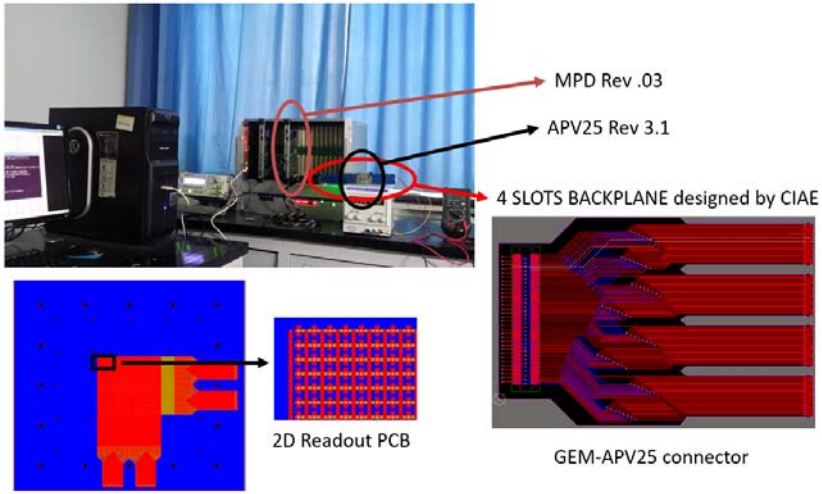
FPGA Development

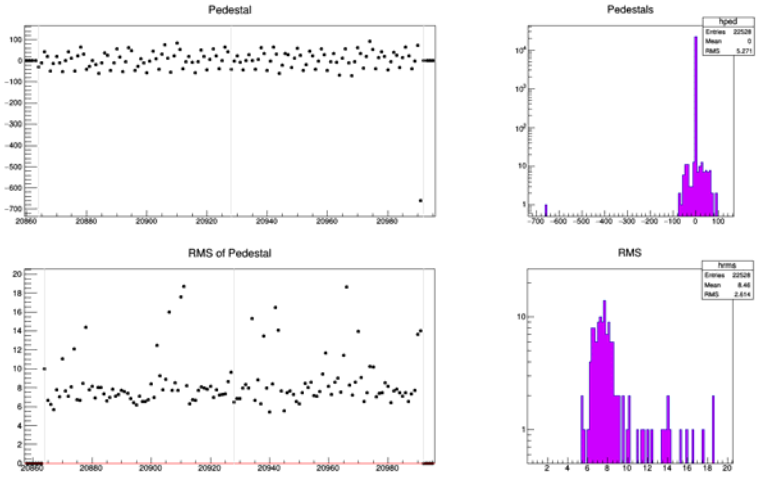
- Progress
  - Software : finished the functional simulation of the tracking logic
  - Hardware: elementary IO (JTAG) and control of the development board
- Issues
  - Communication via ethernet port too complicated in current stage



GEM Test Setup

- Built a GEM test setup and tested its electronics.





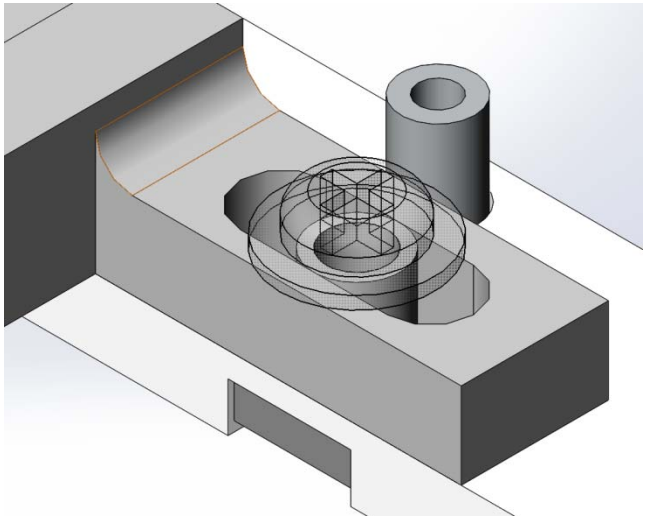
Progress on GEM detector R&D

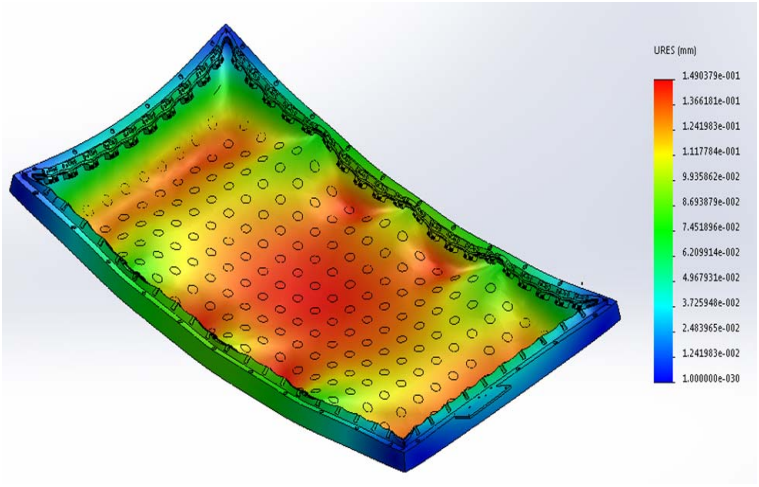
- GEM lab expanded and refurbished

USTC

GEM Design Optimization

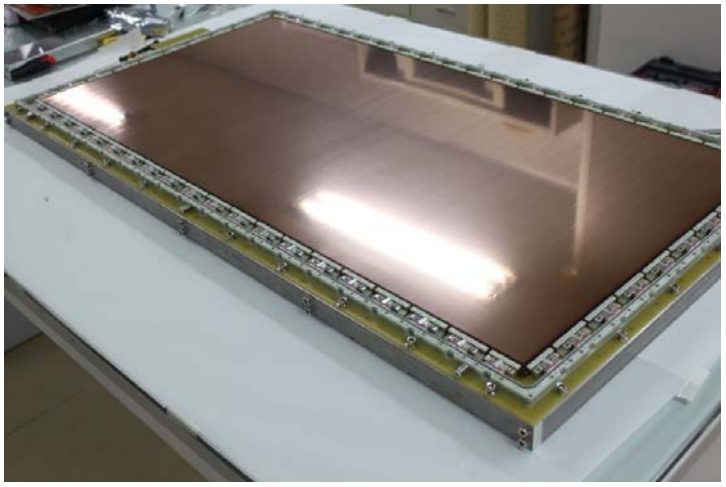
- Lots of effort put in optimizing design for 1m*0.5m GEM (SoLID GEM size) to minimize structural deformation and get GEM foils stretched uniformly.

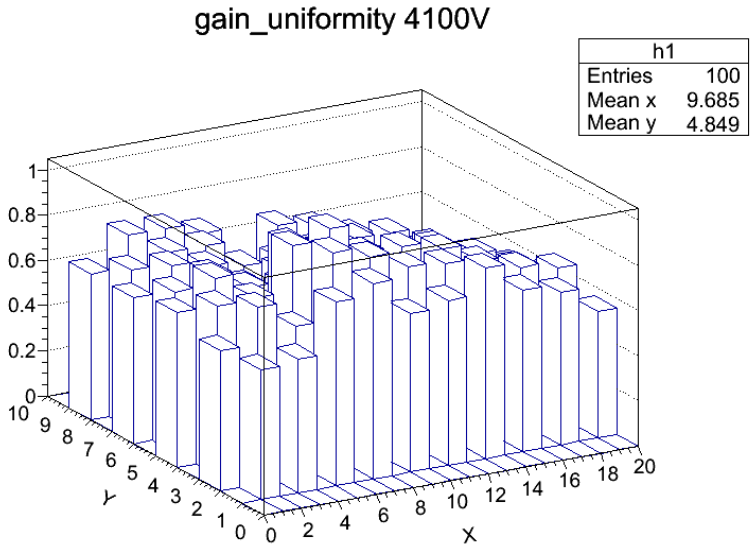




Large-area GEM prototyping

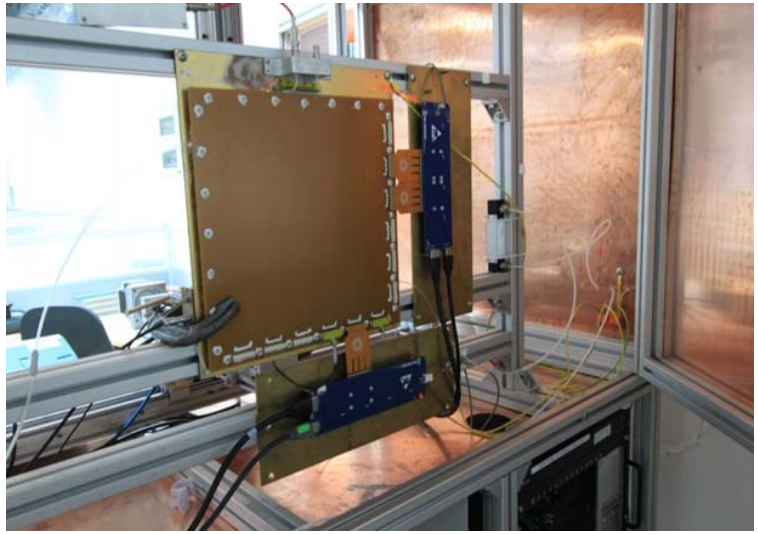
- Built a 1m*0.5m GEM prototype with the optimized design.
- High quality GEM stretching with no visual wrinkles and very good gain uniformity ~ 15%

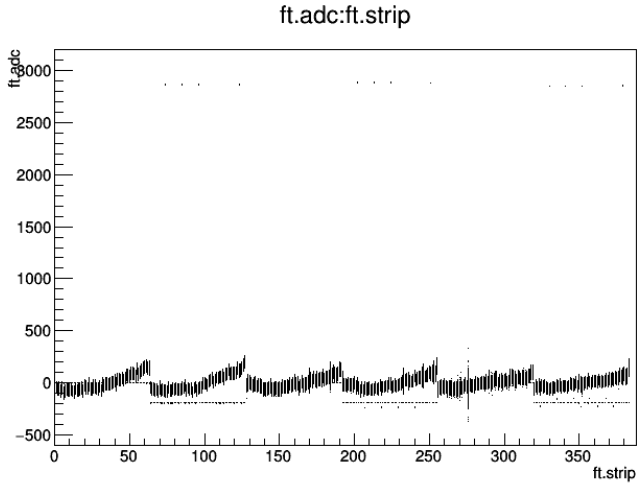




APV25 GEM Readout

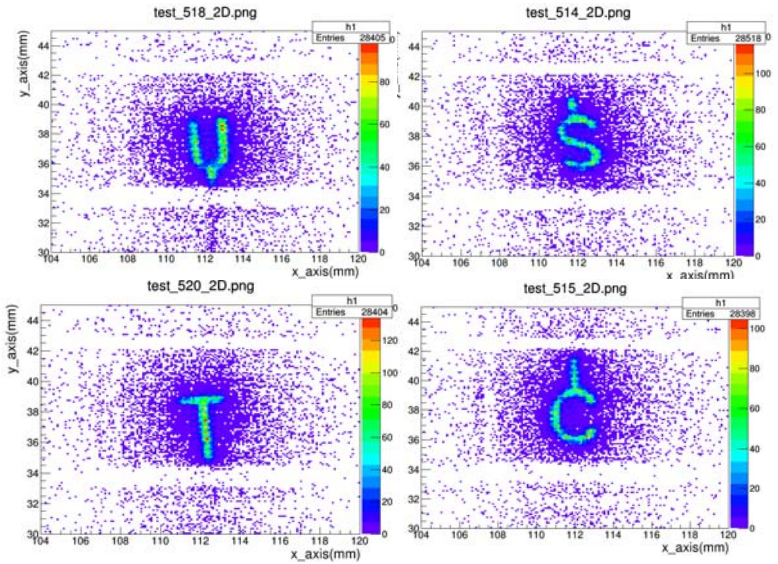
- The APV25 readout system purchased from Italy is finally fully working! Thanks to Paolo and Evaristo for help with tuning the system.

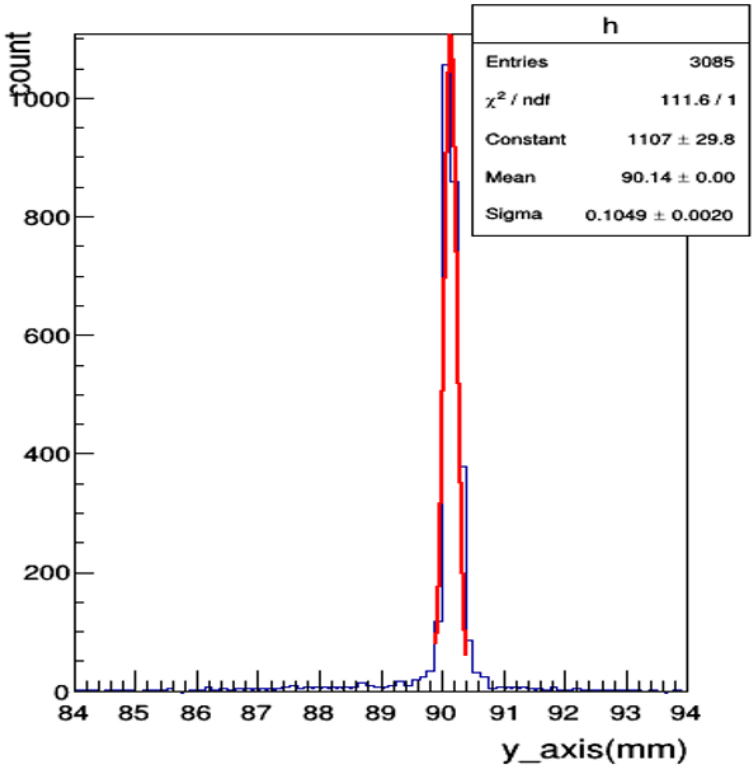




Tests of GEM with APV25

- X-ray imaging and spatial resolution measurement.





News

- We’ve lately submitted a proposal for a collaboration project between China and US to the MOST (Ministry of Science and Technology of China).
- Proposed research topics in the project cover GEM R&D and physics.
- Proposed total budget: 5M RMB

All