

INFN GEM Update:

5/12/21-5/18/21

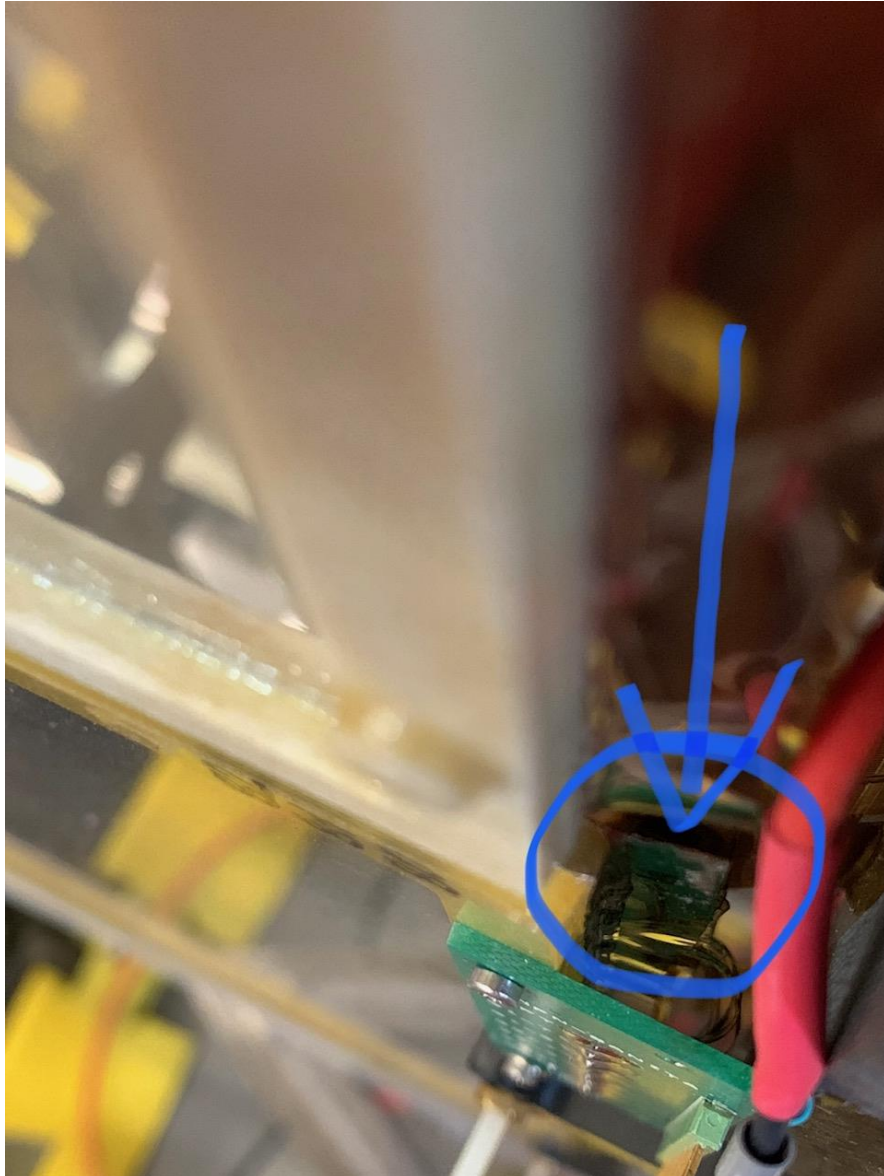
Ezekiel Wertz (onsite), Robert Perrino(remote), Evaristo Cisbani (remote), Holly Szumila-Vance (onsite), Chuck Long (onsite), Jack Segal (onsite)

Recent Activities:

TEDF Activities (May 12-18)

- Investigating causes and ways to prevent future HV problems.
- Gas Window develops odd texture on all modules with aluminized mylar. Believed to be that the external aluminized mylar has attracted to or connected with the drift layer. Exploring Options.
- Created initial design for shielding support frames.
- Returned exterior aluminized mylar windows to 'normal' conditions, by measuring resistance between mylar window and drift foil. Effectively discharging the exterior aluminized mylar window.
- Jack is working on modifying the HV dividers with the conformal coating and the 1 GigaOhm resistor for applicable HV dividers.

Build-up or Corrosion on HV Divider?: TEDF May 13-17



- HV board on lowest module of layer J0.
- On the Kapton flaps, looks like there may be some sort of build-up of material. Not sure what it is.
- From the other side it is kind of difficult to see.
- Could there be corrosion or material build-up affecting this arcing problem.

Exterior Aluminized Mylar of GEM Windows: TEDF May 12-13



Middle Module J0



Bottom Module J0



Top Module J0

Also occurring on bottom module of layer J2. Texture pattern is more towards the center of GEM modules. As if goose-bumps have formed throughout the region. Only happened after turning HV on for a few days. Believed gas pressure was not strong enough to keep these apart.

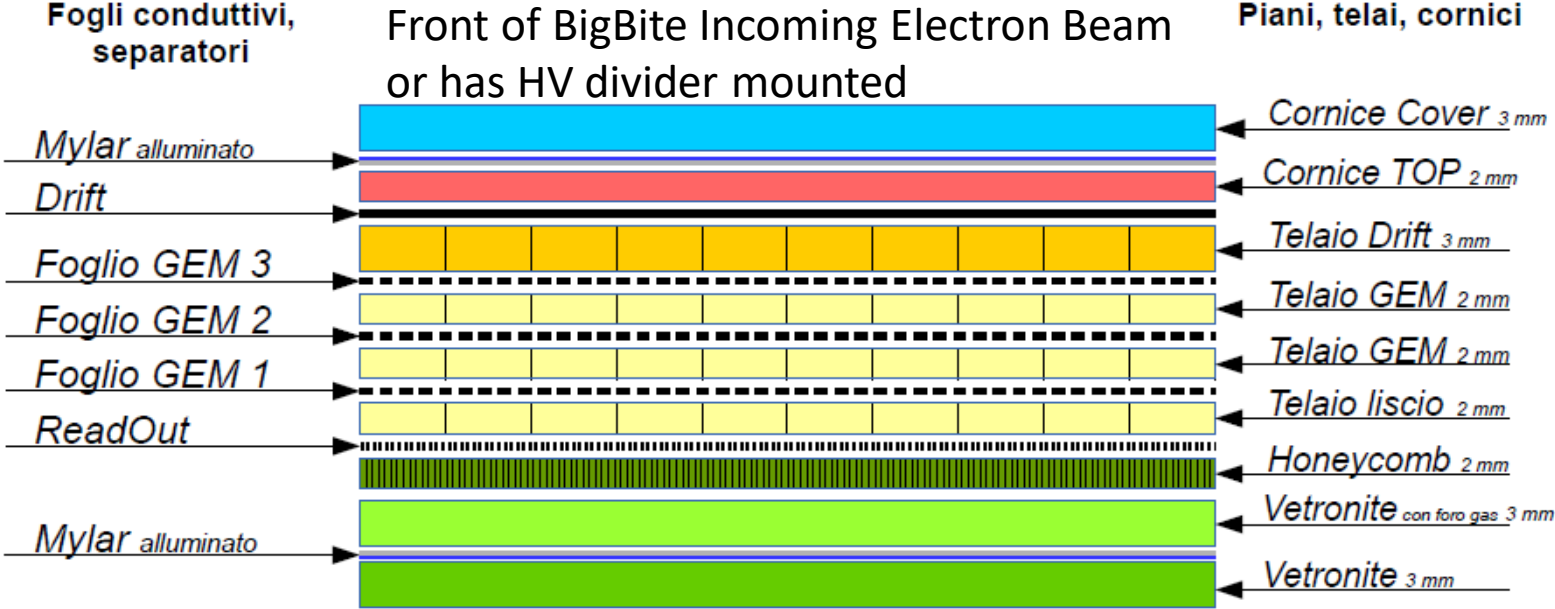
Exterior Aluminized Mylar of GEM Windows: TEDF May 12-13



Translation: Telaio = Cornice = Frame

Foglio = Foil

What's going on: After turning on HV over the weekend electrostatic forces are present that have caused the exterior aluminized mylar to be attracted or connect to the drift foil. **This is not a good thing! Causes changes in data.**



Side that faces other GEM layers and GRINCH or has gas tubes mounted

Exterior Aluminized Mylar of GEM Windows Good: TEDF May 17



Bottom & Middle Module J0



Top Module J0

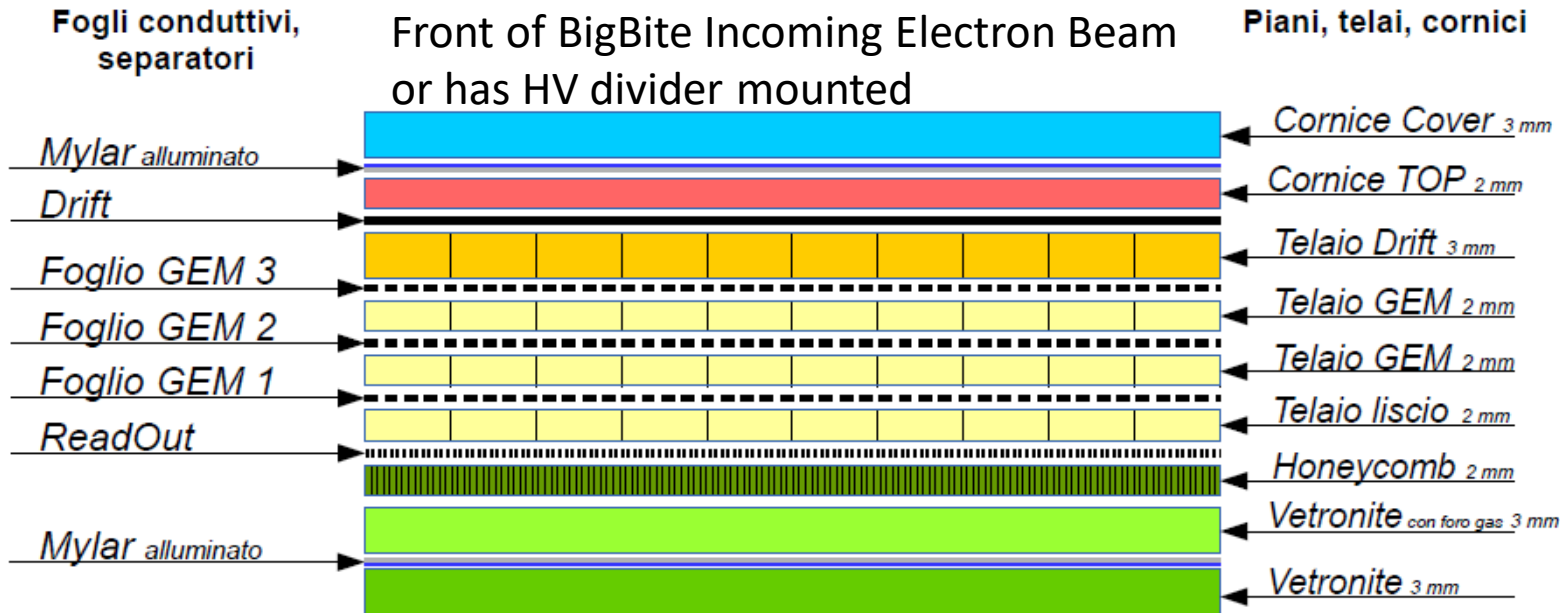


Bottom Module J2

What Changed?: Measured the resistance between the exterior mylar and the drift foil. Based on how the multimeter works to measure resistance, by sending a small amount of current to determine an impedance. This effectively discharged the two foils and removed any electrostatic forces that influenced the shape of the external aluminized mylar.

Long Term Solution for External Aluminized Mylar and Drift Foil

Translation: Telaio = Cornice = Frame
Foglio = Foil



Side that faces other GEM layers and GRINCH or has gas tubes mounted

Possible solution: Since the two foils are disconnected. Connect a 1 GigaOhm resistor between the top exterior aluminized mylar and the drift foil, in essence creating a small Faraday cage effect and then the two foils will not connect again. This exterior mylar is then at the same HV as the drift foil. This solution has already been implemented by UVa. This problem is not thought to appear for INFN modules when horizontal. Working with Jack to do this modification.

What to do next?

- Test Lab GEM Chambers
 - Make comparison between INFN Test Lab and TEDF. Data exists, just need to make plots
 - Change to metal cable trays for layers J1 and J3
 - Resolve Low Level Plots, due most likely to cable connections
 - Evaluate pedestal RMS plots and look for any noise cards, potentially altering APV cards
 - Once pedestals look good, take cosmic data and evaluate Hit Maps
 - If time permits resolve J4
- GEM Chambers in BigBite
 - **GEMs move with BigBite to Hall A on May 24th!**
 - Make progress with shielding these GEMs before move.
 - Resolve HV problems and test.
 - Resolve problem with exterior mylar and drift foil.
 - Prepare GEMs for move to Hall with BigBite
 - Setup any remaining software/programs for INFN GEMs in BigBite configuration.
 - Documentation for LV, Low Level Troubleshooting, and in general. Basically manual update.

Questions?

