Fermilab Test Beam Details: Past and Future

Grace Cummings

Test Beam Summary

May 31 - June 07: Muon beam format

- April 24 -26: timing-focused test beam partnered with CMS ETL
  - used single-crystal setup currently @UMich w/ boards designed by UVa
  - Work onsite: myself and Chris Madrid (for ETL DAQ support)
- May 31st - June 7th: muon beam potential
  - Joint CalVision and TTU
  - requested
- After June 7th
  - harder to get muon beam time

- Secondary user to CMS ETL
  - access when they access
  - they control beam rate/size
- few hundred muons per spill
  - 4 s spill every minute
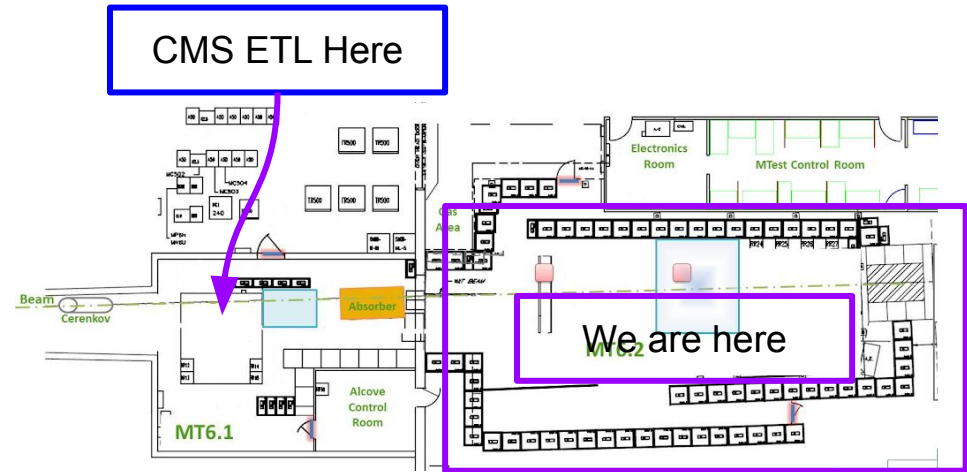
CMS ETL Here

We are here

General Status of Future Testbeams- As I see it

- May 31st - June 7th: muon beam potential
  - **has been requested**
  - Joint CalVision and TTU
  - Nominally: using single-crystal setup currently @UMich w/ UMich mechanics
  - Ideally: new designed box +boards from UVa + UMaryland
    - lyso telescope
    - cooling
  - Limiting factors:
    - person power
    - readiness for good data
- After June 7th
  - Limiting factors:
    - beam time

General structure:

Slots are Wed-Wed
Tuesday before: Radiation training
IN-PERSON (necessary)
Wed_1 -> ORC and install
Wed_2 -> Uninstall and rad survey to release equipment

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Really hard week - also US CMS

CalVision Post Docs
- Yuxiang
- Myself
  - Help setup, get started, get organized, emergencies
  - **very limited availability**
    - working hours only + analysis split + new intern arriving

TTU Team
- 7 people have requested access, **but available?**
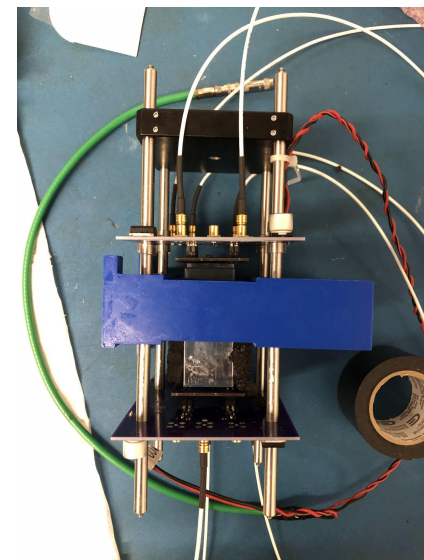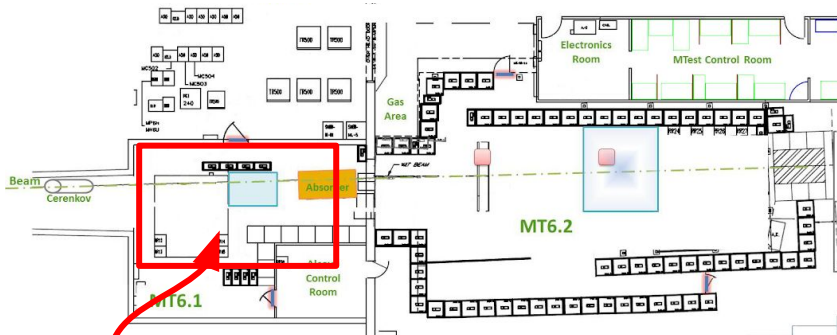
UMich
- 3 students, **access in time?**

Test beam requirements

- Trainings (does not include basic ones of FNAL access, consult your ITNAs)
  - FN000311 / CR Fermilab Controlled Access
  - PDFTBF01 / CB FTBF Hazard Awareness Training
  - FN000735 / CB GERT - (General Employee Radiation Training)
  - FN000470 / CR Radiological Worker - Classroom (Virtual)
  - FN000731 / CB Radiological Worker - Just-in-Time (Virtual)
  - FN000471 / OJ Radiological Worker - Practical Factors --- THIS ONE IS IN PERSON
- Access to site
  - Request early: https://get-connected.fnal.gov/accessandbadging/access/
  - Request for 1 year **DO NOT ONLY PUT DATES YOU ARE COMING**
  - If part of CMS, Dee Hahn is your lab contact
  - If you mention me in your access request, please tell me
- CMS and need housing
  - Please fill out this survey: https://docs.google.com/forms/d/e/1FAIpQLSdk_endNV8HhduRLsb3mafl6QTspbyLzVh8g3qmXXjwls92BA/viewform
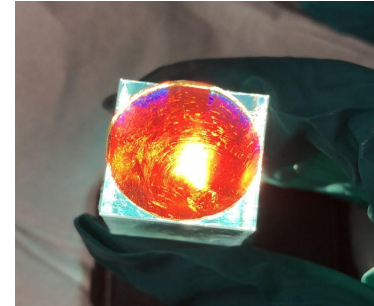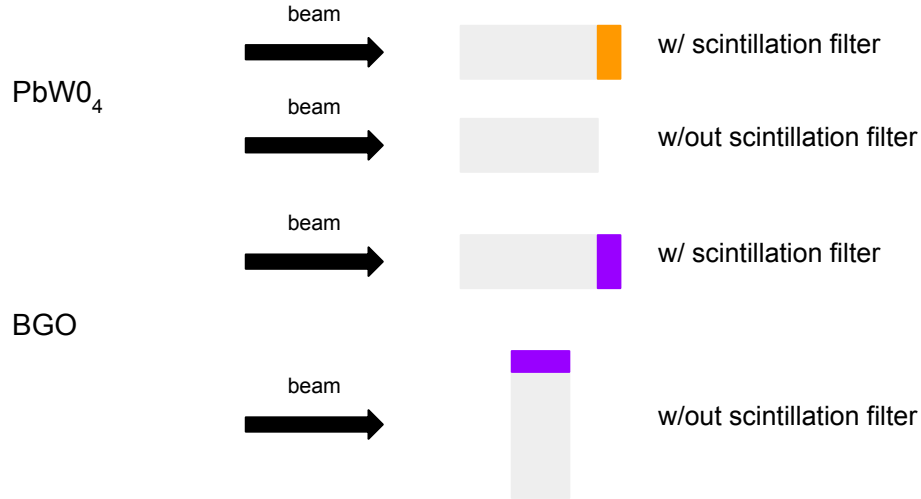 - Does not get you housing, but Fermilab is struggling with housing, so data is important

April Test Beam

- Focused on timing reconstruction
- Partnered with CMS Endcap Timing Layer
  - Thanks to Chris Madrid
  - Used there DAQ + MCP+ box
  - 7 SiPM readout + MCP
    - 8 channel scope readout
- 120 GeV Protons
  - 4s spills, 1 spill a minute
  - ~60,000 events per spill
  - 3 cm x 3 cm beam spot
  - pixel telescope for position
- 1.5 days of data ~30 hours of work
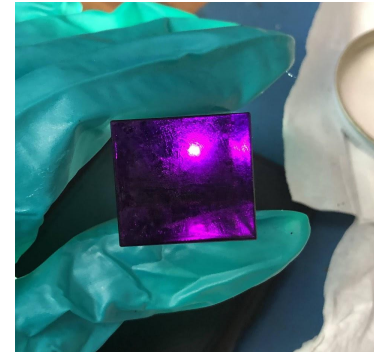- Data analysis
  - on going!
  - Expect results soon

April Test Beam

4 orientations

PbW0$_4$

beam → [w/ scintillation filter]

beam → [w/out scintillation filter]

BGO

beam → [w/ scintillation filter]

beam → [w/out scintillation filter]

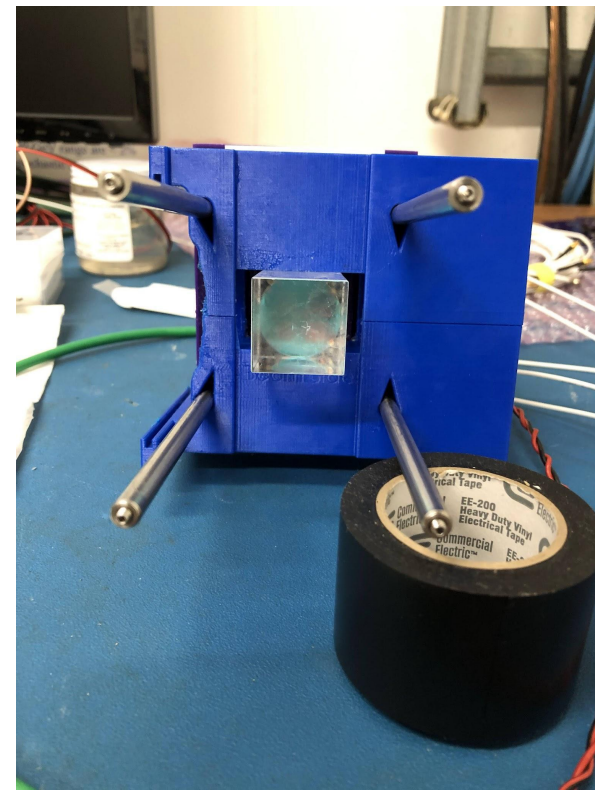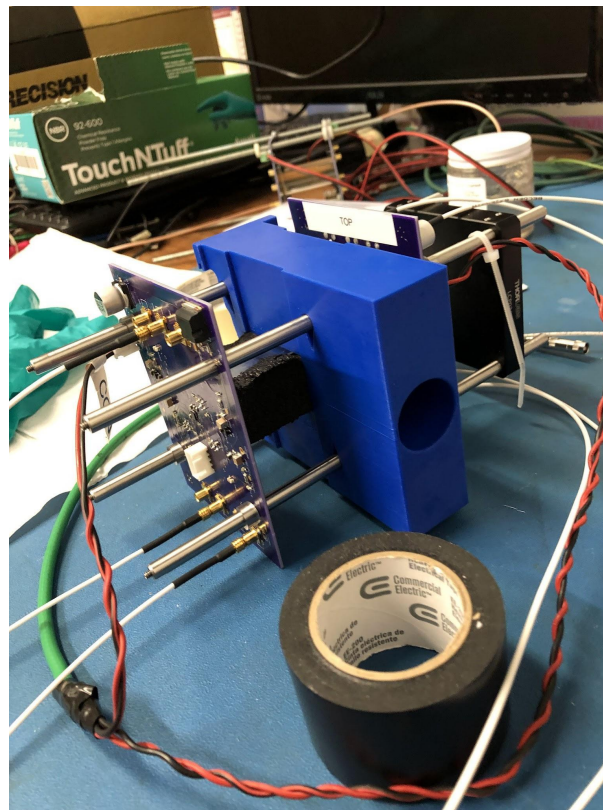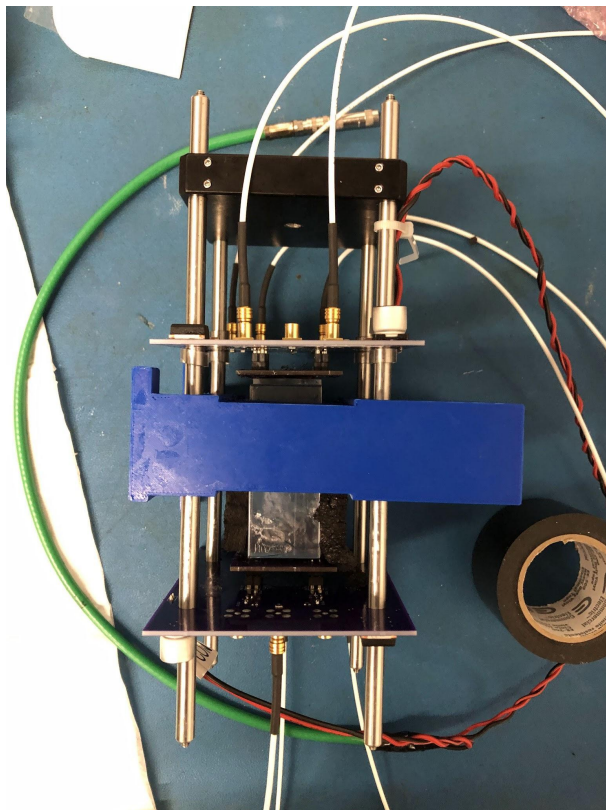
660 nm long-pass on PWO

U330 notch- filter on BGO

Really all we had time for, not ideal!

Always same SiPMs on a side
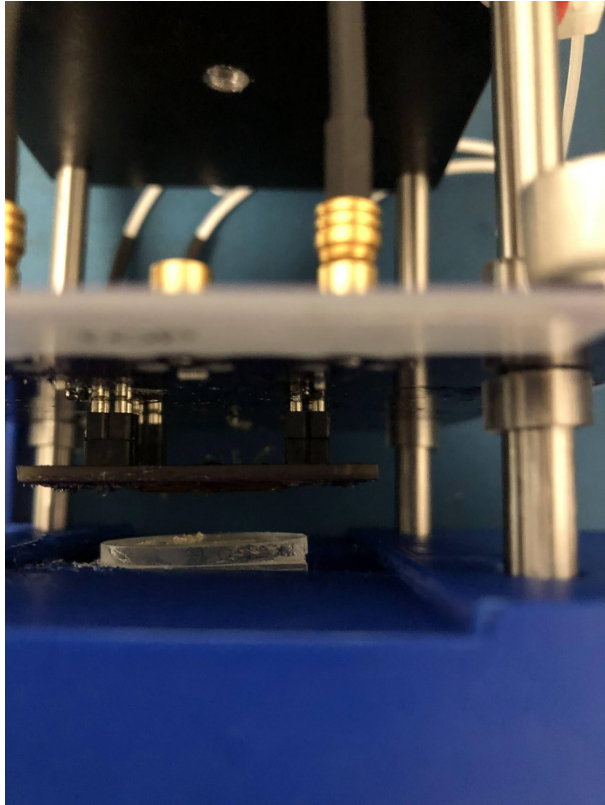Poor position control (may be ok for timing)

Just stuck on with thin layer of grease
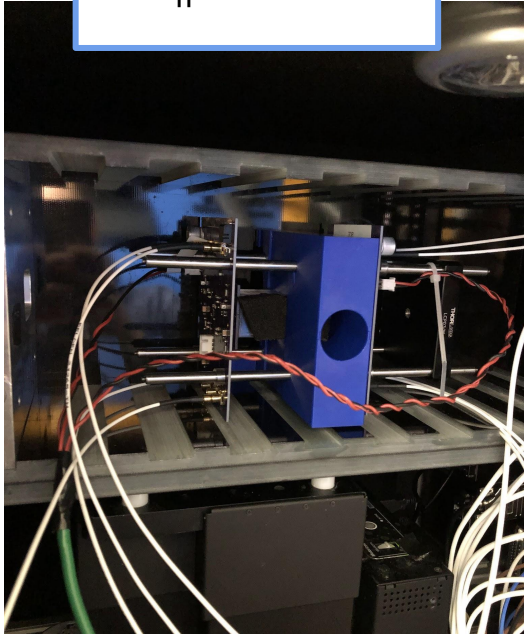
April Test Beam

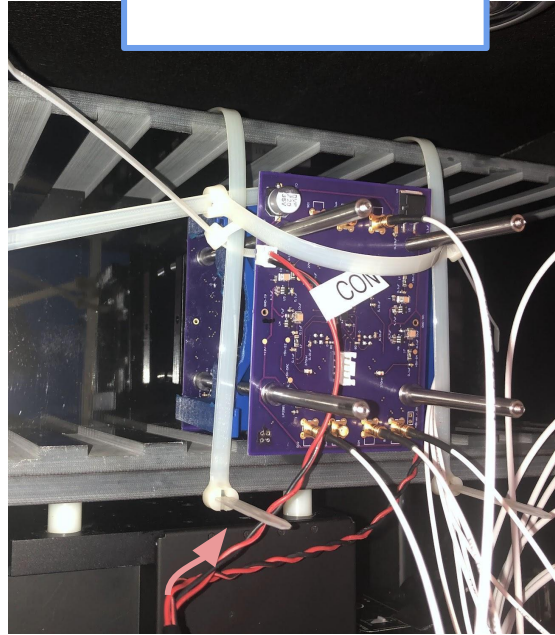🔶 **Fermilab**

April Test Beam

Obvious wiggle room - too many degrees of freedom for the crystal/SiPM/filter connections
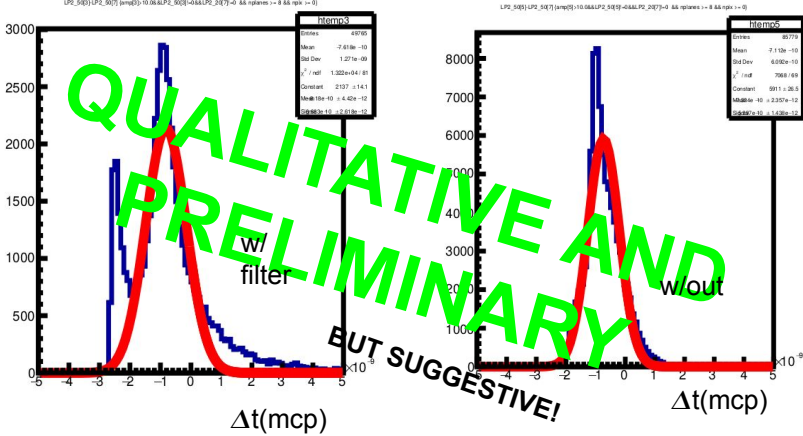
🟢 **Fermilab**

April Test Beam

|| to beam

⊥ to beam

UMich mount and motion stage would not fit, so just had to be set inside box (carefully)

Suggestive DQM plots

QUALITATIVE AND PRELIMINARY

BUT SUGGESTIVE!

w/ filter

w/out

Δt(mcp)

Δt(mcp)

May be noise!

Can see the SiPM (sometimes)

🎺 Fermilab