Test stand/early test beam preps
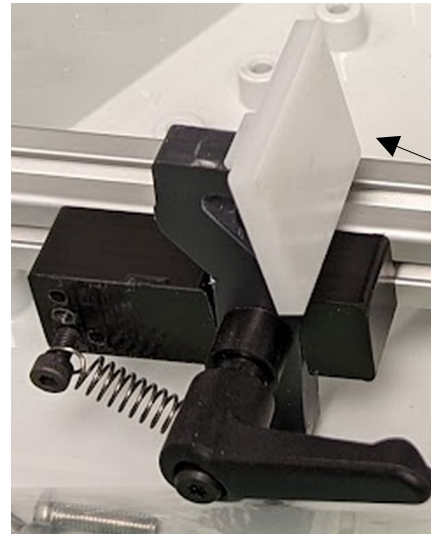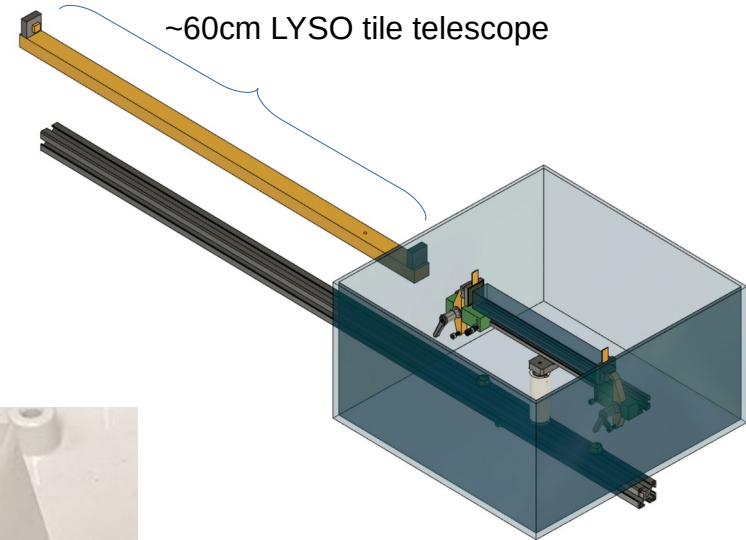
Making progress on our test stand set up

Reminder: goal is to have a dark box with easy xal swapping

- adjustable xtal orientation
  - Parallel beam
  - Or perpendicular ~center w/ angle adjustment
  - LYSO trigger telescope aligned w/ xtal target
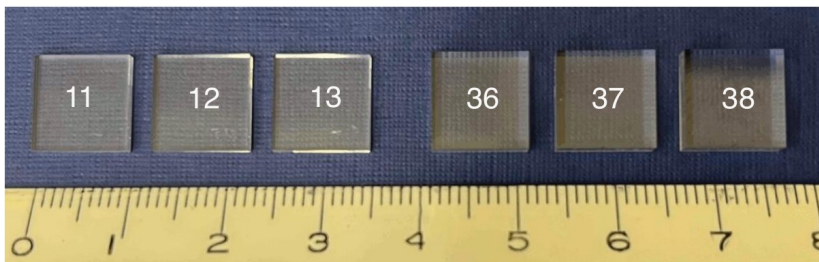- Also can be used for cosmics @ low rates

~60cm LYSO tile telescope

Flex mount w/ tensioner for SiPM board
- Redesigning SiPM boards now
- Modify connection to amps from daughter card design to flexible cable, get heat away from SiPMS
- In principle could add very rudimentary temp stability control to box ~room temp (tbd)
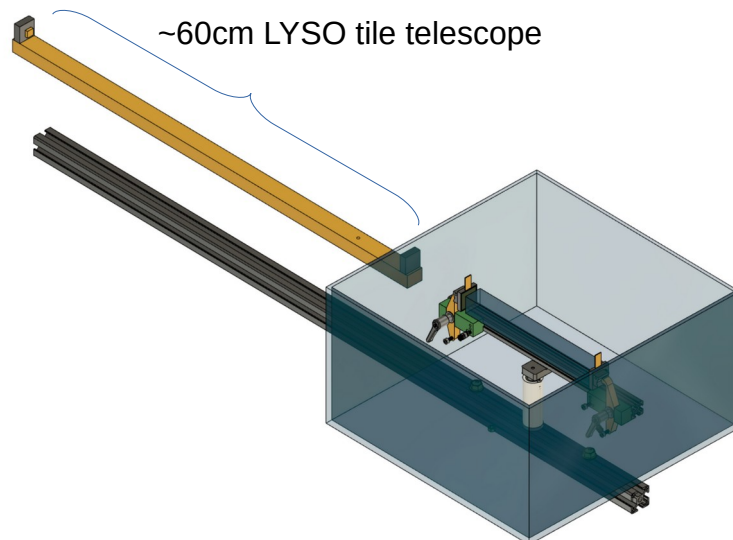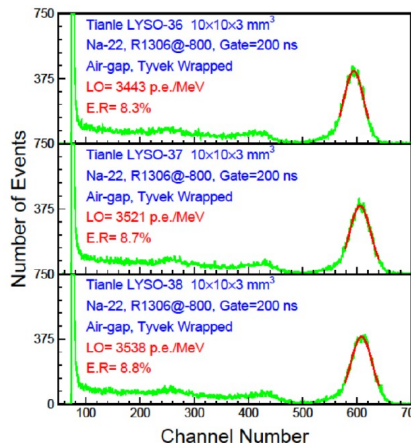
Surveyed existing hardware and made plans to get additional trigger/daq equipment w/ Sarah/Junjie for future single xtal/small matrix test beams

Test stand/early test beam preps

Thank you Renyuan and Liyuan for new LYSO plates

Report on Six LYSO:Ce Plates for Virginia

ID	Samples #	Dimension (mm^3)	Polishing
Tianle LYSO-11, 12, 13	3	10×10×1.5	All faces
Tianle LYSO-36, 37, 38	3	10×10×3	All faces

ID	Dimensions (mm^3)	EWLT (%)	ER (%)	200 ns LO (p.e./MeV)	Fit LO (p.e./MeV)	Decay Time (ns)
11	10×10×1.5	81.2	9.5	3008	3036	39
36	10×10×3	80.0	8.3	3443	3447	39

Tianle LYSO-36 10×10×3 mm^3
Na-22, R1306@-800, Gate=200 ns
Air-gap, Tyvek Wrapped
LO= 3443 p.e./MeV
E.R= 8.3%

Tianle LYSO-37 10×10×3 mm^3
Na-22, R1306@-800, Gate=200 ns
Air-gap, Tyvek Wrapped
LO= 3521 p.e./MeV
E.R= 8.7%

Tianle LYSO-38 10×10×3 mm^3
Na-22, R1306@-800, Gate=200 ns
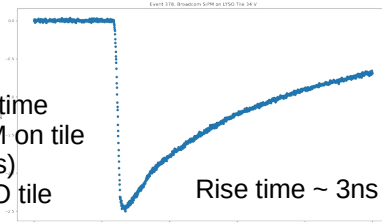Air-gap, Tyvek Wrapped
LO= 3538 p.e./MeV
E.R= 8.8%

~60cm LYSO tile telescope

Designing small amp boards w/ trigger discriminators for telescope
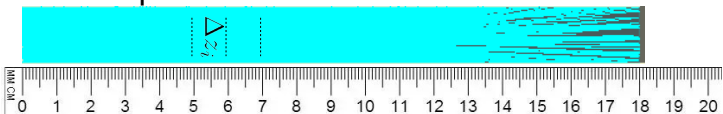- Will probably read out analog as well for slew corrections

Example shown last time
New Broadcom SiPM on tile
6mmx6mm (40u cells)
1cmx1cm 3mm LYSO tile
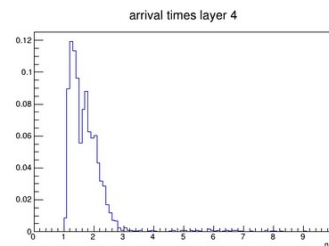
Rise time ~ 3ns

Simulation/prep for FCC workshop

Implementing initial fast optical photon modeling using Sasha Ledovskoy's method for CMS
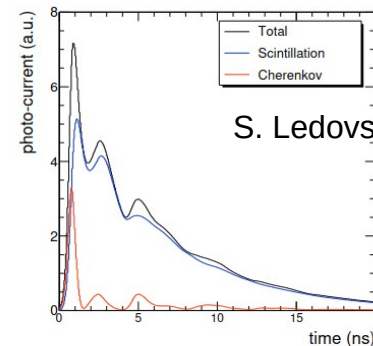
Scint photons from 1GeV muon

Using standalone MC for now

arrival times layer 4

For illustration only: simulations for CMS ECAL

- Generate photons in flat λ spectrum, in all of xtal (Bob,Hayden)
- Make PDFs wrt location (Δz bins), λ => time/λ dist of γ's reaching SiPMs (Michael) ✓
- Generate closure samples w/ hit information (position, time, E) + full ray tracing (Hayden) ✓
- Test fast sim (work in progress, Michael) ✓
  - E → photon spectrum/yield from properties
  - Convolute hit time w/ decay spectrum
  - Use PDFs to estimate light on SiPM + spectrum + timing dist
  - Progress report at BNL Meeting

Work on Opticks/CaTS temporarily stalled. Code is built, but versioning problems between examples an latest code base. Need fixes from Hans to begin testing.
- Longer term, Hayden will be joining Celeratas effort to implement heterogenous GPU acceleration to Geant4

S. Ledovskoy