



Fermilab Update: April 6th, 2023

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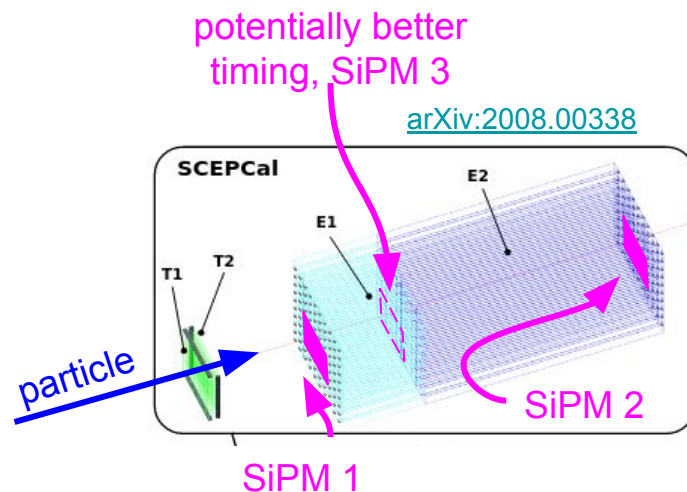
CalVision General Meeting, 06 April 2023

Existing Thrusts

- Thin-film filters for wavelength separation
 - develop and test them here
- Photon ray-tracing on GPU within Geant
 - CaTS package (Calorimeter and Tracker Simulation) interfaces Geant with Opticks (open-source project for photon ray-tracing via NVIDIA OptiX package)
- On-detector Cerenkov and Scintillation light separation (in ASIC)
 - Time and wavelength separated  more details in this talk!
- Precision timing characterization
 - New! An aspect of my research plan here at the lab
 - Compliments existing efforts within CalVision, and lab-directed goals
- Testbeam coordination  more details in this talk!

New Initiatives Funding Proposal

- Submitted a [New Initiatives](#) funding proposal
 - ~ \$50k from KA25 lab funding
 - Noble Gas calorimeters and pico-second timing detector prioritization this round
- Proposal: precision timing characterization of crystal DR calorimeters
 - Crystals are fast-ish
 - scintillation limited by “landau jitter”
 - Cerenkov light used in precision timing
 - synergies with CMS Endcap Timing Layer
 - i.e., infrastructure



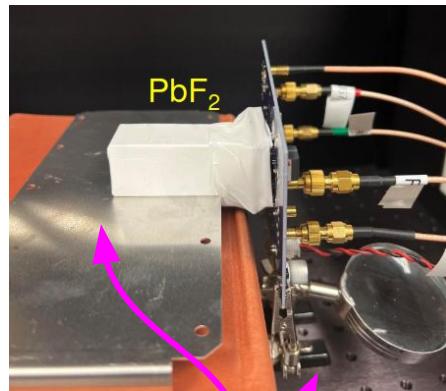
Looks like CMS BTL, but turned 90°
(and, well, larger)

Proposal submitted, waiting to hear back.

The plan, so far

- Funding to build a teststand so we can do timing studies here
 - Baseline characterization -> avenues for improvement
 - Target an LDRD based on findings
 - directly to FE electronics
 - novel materials
- Swashbuckling April testbeam
 - Borrowing UMich's teststand
 - Will meet them at Notre Dame the 21st
 - Joint ETL beam - protons
 - using their dark box and DAQ
 - Shower not fully contained, but this is ok for timing!

UMich single-crystal setup (old)



Have a second board for the other side

Mount into an ETL box, readout with their scope/system



Info needed for April

- Thomas sent me v1 boards
 - Mock power and readout connections to get ORC
 - “install” the mock system April 12th
 - Go through ORC with the rest of ETL
 - Have to have power/readout/services connected
- Info needed for April testbeam (ASAP):
 - Dimensions of the crystal
 - The number of SiPM bias channels needed (Is it 2, one for each board?)
 - The number of LV channels needed to power the amplifiers
 - The total height of the apparatus (edges of your support rods included)
 - The distance between the edge of the readout boards and the side of the crystal
 - The type of crystal
- Do we need cooling?

Basically I just need the mechanical specifications so I can get the box ready!

Dedicated Test Beam

- Testbeam at FNAL available until July 7th
 - should be available again in late fall
- For a muon beam, we want the Section 2 areas
 - [Link to area descriptions](#)
 - At least one area in Section 2 available for late May/June
 - Would have to negotiate with the other section 2 users
 - No one else on schedule in section 2
 - **May 31st - June 6th**
- [Form for beam requests](#)
- [Current schedule](#)

Details we need to provide:

1. Energy of beam
 - a. < 2 GeV
 - b. $2 \text{ GeV} < \text{beam} < 30 \text{ GeV}$
 - c. up to 80 GeV
2. Counts per spill
3. Services

