

Requested time: 1-2 weeks May

Main purpose: First full module test & H2GCROC tests

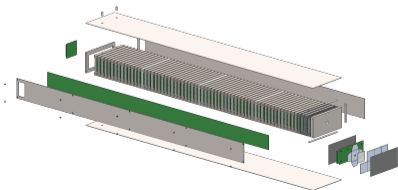
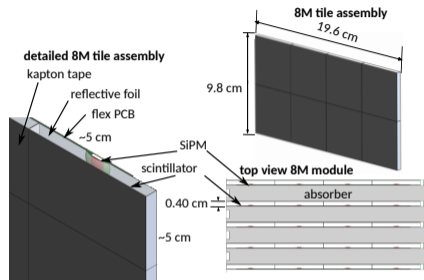
Location: Fermilab or together with FoCal CERN SPS

Setup:

- Full 8M module testing 65 layers of absorber & scintillator per layer 8 channels (swapping scintillator geometry either 8M module or insert)
- Readout with multiple CAEN DT5202 64ch CITIROC SiPM readout units or H2GCROCs

Main expected measurements:

- Energy resolution estimates for hadrons and electrons for full length module
- Assessment of longitudinal leakage
- Longitudinal shower development
- Read-out validation
- Ideally part of the campaign with the addition of the ECal in front



Requested time: 1-2 weeks September/October

Main purpose: Resulution studies

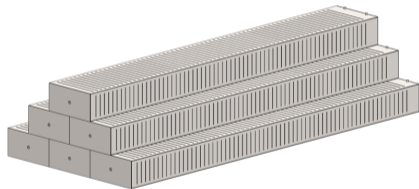
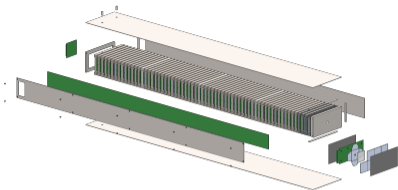
Location: CERN SPS

Setup:

- 4-8 full 8M modules (ideally 40x40x140 cm), optionally with ECal upfront
- Readout with H2GCROCs

Main expected measurements:

- Energy resolution for hadrons and electrons
- Assessment of longitudinal/transversal leakage
- Longitudinal shower development
- Final-Flexible PCB validation & first long PCB validation
- Ideally part of the campaign with the addition of the ECal in front

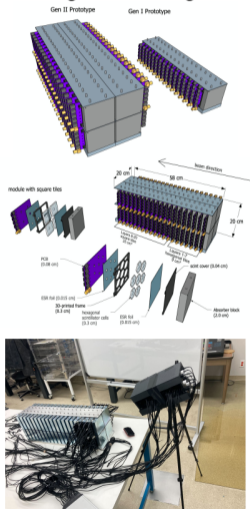


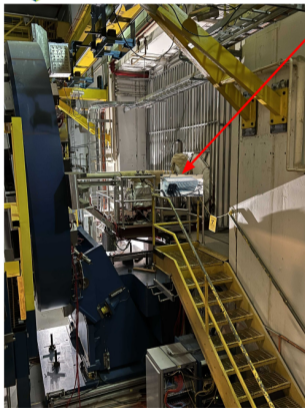
We will be testing our Insert “gen-II” prototype:

- 1) **Parasitic test at the east-side alcove of the STAR hall during the RHIC 200 GeV pp run in 2024 (January-June). Goals:**
 - Operating and calibrating the prototype in realistic conditions, as well as quantifying system degradation due to radiation damage.
 - Demonstrating mitigation strategy for radiation damage (annealing, large SIPM, etc)
 - Measurement of MIP response using isolated tagged charged hadron.
 - Measurement of core of hadronic shower using isolated tagged charged hadron.
 - Measuring π^0 invariant mass and spectra to verify calibration and showcase the separation of two showers with a fine 3D shower shape.

- 2) **Second test with 4 GeV positrons at JLab (Hall-D) during Fall 23. Similar to our first test beam done in Jan 2023 ([arXiv:2309.00818](https://arxiv.org/abs/2309.00818)) but with x10 more channels**
 - Test hexagonal, staggered design and HEXPLIT algorithm ([arXiv:2308.06939](https://arxiv.org/abs/2308.06939))
 - Demonstrate 3D shower shape measurement with better granularity and x10 more channels compared to our first test beam.

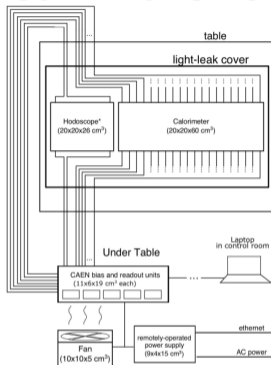
- 3) **Test beam with hadrons and electrons at FNAL (when available).**
 - Combined performance study with ECAL (WSciFi) module.





We plan to mount prototype here

- Prototype will cover $3.5 < \eta < 4.3$ and ± 25 degrees in azimuthal angle
- Prototype large Enough to capture $\text{Pi}0$ and EM core of hadronic showers



Strategy:
Fully standalone DAQ & trigger.

Trigger:
- Charged-particles with hodoscope
- Calorimeter trigger for $\text{pi}0$

Pythia8 sim with prototype acceptance cuts

