

An aerial photograph of a large circular facility, likely a particle accelerator, with a blue overlay. The facility features a large circular structure with concentric rings and various smaller buildings and roads surrounding it.

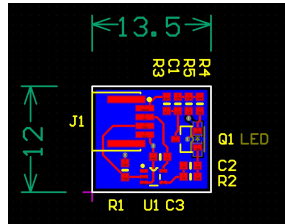
Barrel Imaging Calorimeter

- Built-in calibration systems/tools

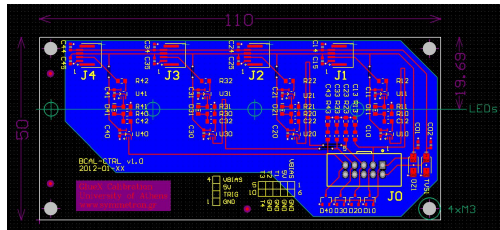
LMS – modelled after GlueX-BCAL LMS



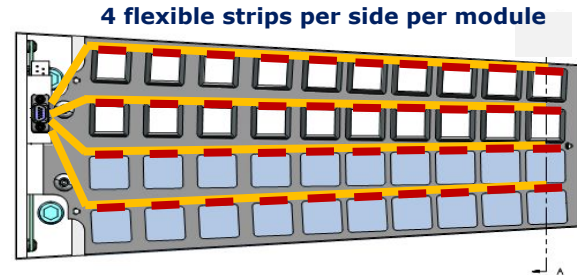
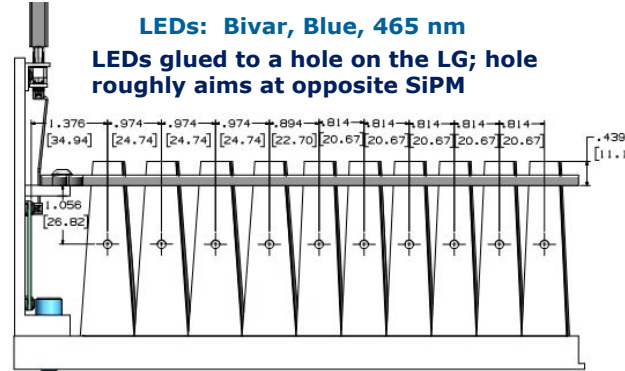
BCAL miniboard layout
("components" side,
LED on the other
side, shining parallel
to the board towards
the right)



BCAL Controller layout



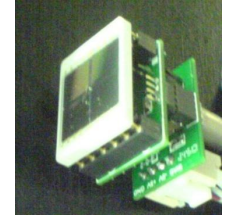
innermost LG 21x21 mm², outermost 27x25 mm²;
output faces are 13x13 mm² to match SiPM window



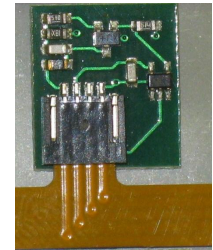
- 1 flex cable per row, connecting 10 mini boards; 384 flex cables
- 4 flex cables connected to 1 BCAL controller; **96 BCAL controllers**
- **1 BCAL controller per half module**; light each row independently
- System typically pulsed at 50-100 Hz

BCAL has 3840 SiPMs, and 3840 LEDs: pulsing both ends decouples SiPM from LED failure

Hamamatsu S12045X



BCAL miniboard on flex cable



NIMA 738 (2014) 41-49

AstroPix Tracker Considerations

- Alignment: software with particle tracks
 - conditions and sample size remain to be determined
- Structures and metrology during construction will provide mechanical alignment / starting point for software alignment
- Mechanical surveying points on the main structures in locations, such that they will be visible, are to be worked out
- Installation will require external tools, e.g. cameras?

Barrel Imaging Calorimeter

- Update on Irradiation Studies

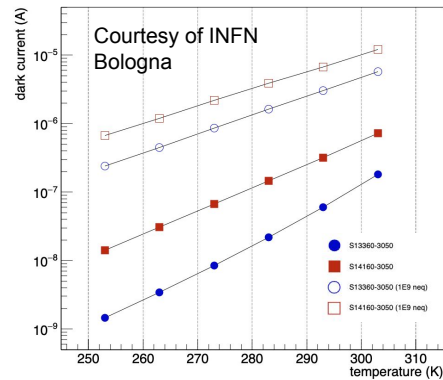
Initial Strategy Presented at TIC on Dec 11, 2023

M. Zurek, <https://indico.bnl.gov/event/21106/>

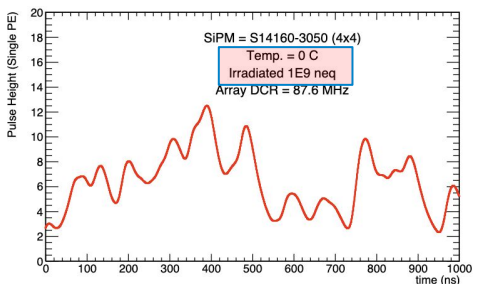
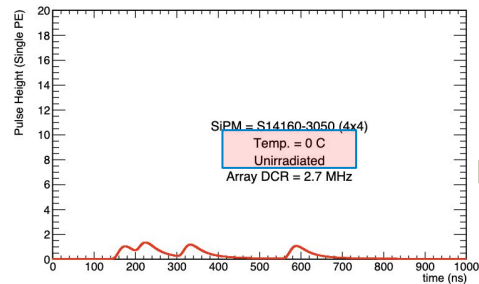
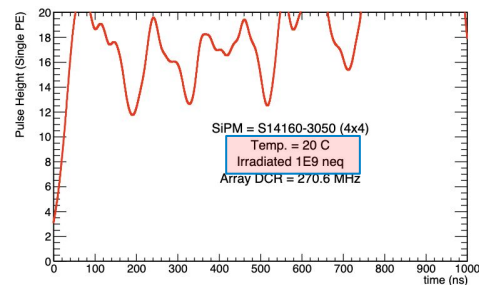
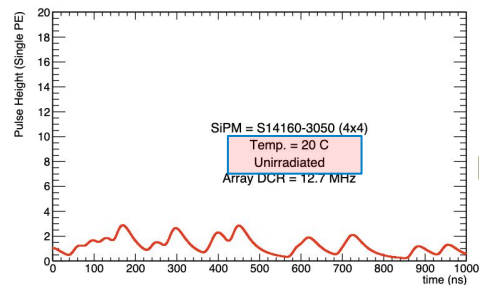
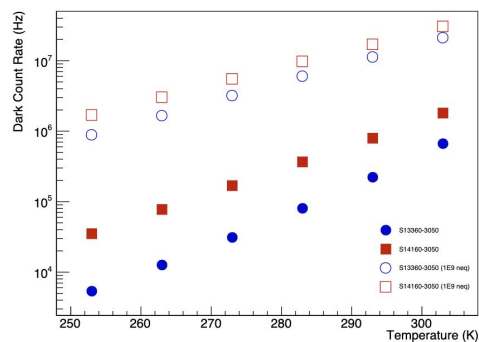
Rad Damage

Update on SiPMs

- INFN Bologna measurements available for S14 and S13 Hamamatsu SiPMs
- Indicate factor 20 increase in dark current is possible during a year of EIC running (10^9 neq)
- **Caveat: worse case scenario!: Naively scale dark current to dark counts (upper limit estimate)**
- If not mitigated, thresholds will need to be increased significantly beyond desired level after irradiation
 - Factor ~ 5 increase in threshold during the first year of running
 - Loss of MIP & few hundred MeV photons
- Mitigation options
 - Use S13360 SiPM
 - Splitting of readout channels to increase S/N for MIPs
 - Lower V_{op}
 - Further cooling of SiPM
 - SiPM annealing
 - Swap SiPMs (+z and -z)
 - Left-Right Coincidence



Scale by gain, q_e



See more here: H. Klest, BIC Simulation Meeting:

<https://indico.bnl.gov/event/21335/>