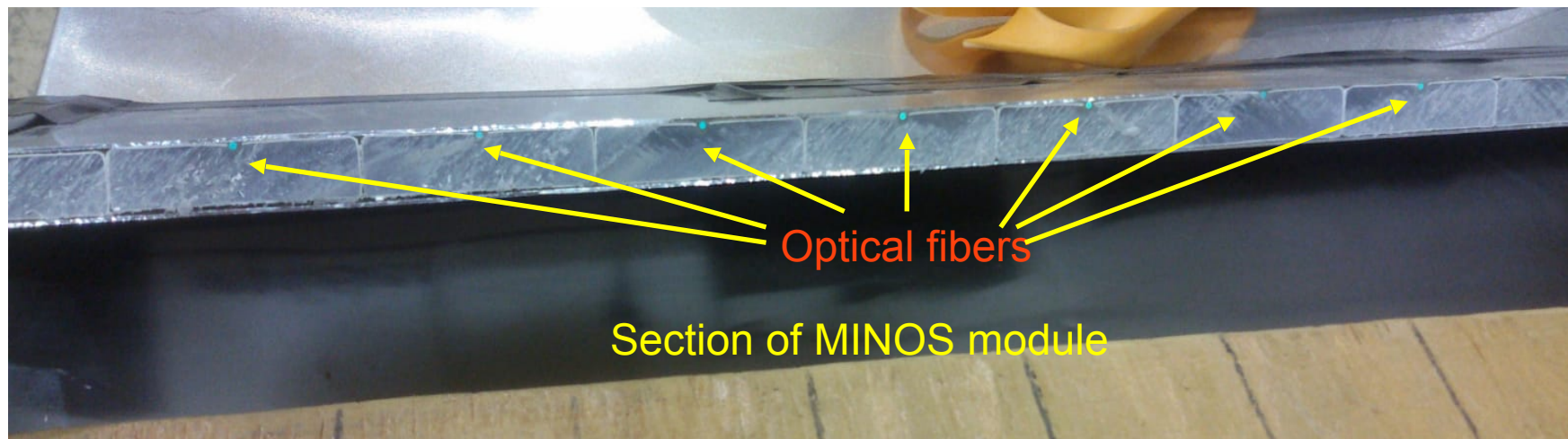


## ICARUS Side CRT preparation June 12 – July 12, 2019

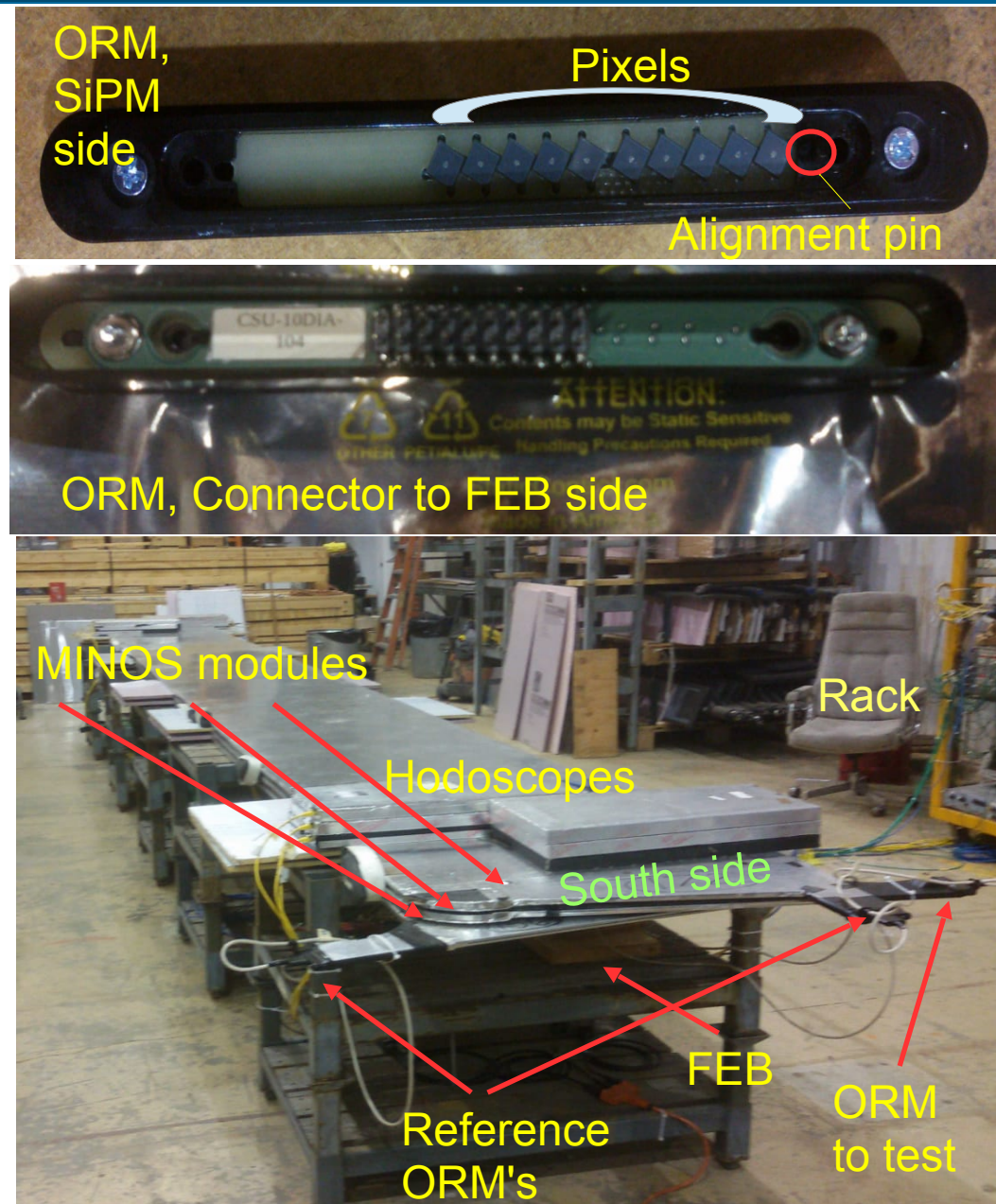


F. Tortorici, INTENSE - WP1

INTENSE General Meeting November 6th - 7th 2019

# Experimental setup

- 3 MINOS modules (which consist of two independent semi-modules);
- 4 groups of three hodoscopes (two groups per semi-module, to cover its full width);
- 6 Optical Read-out Modules (ORM), one for each semi-module;
- 6 Front End Board (FEB) in daisy chain (one board per ORM);
- 1 acquisition rack with standard modules (coincidence, scalers, discriminators,...);
- 1 PPS receiver, used as temporal reference for the boards.
- Full ORM assembly, light tightening by taping (as will be done in actual installation) is good practice for side CRT installation

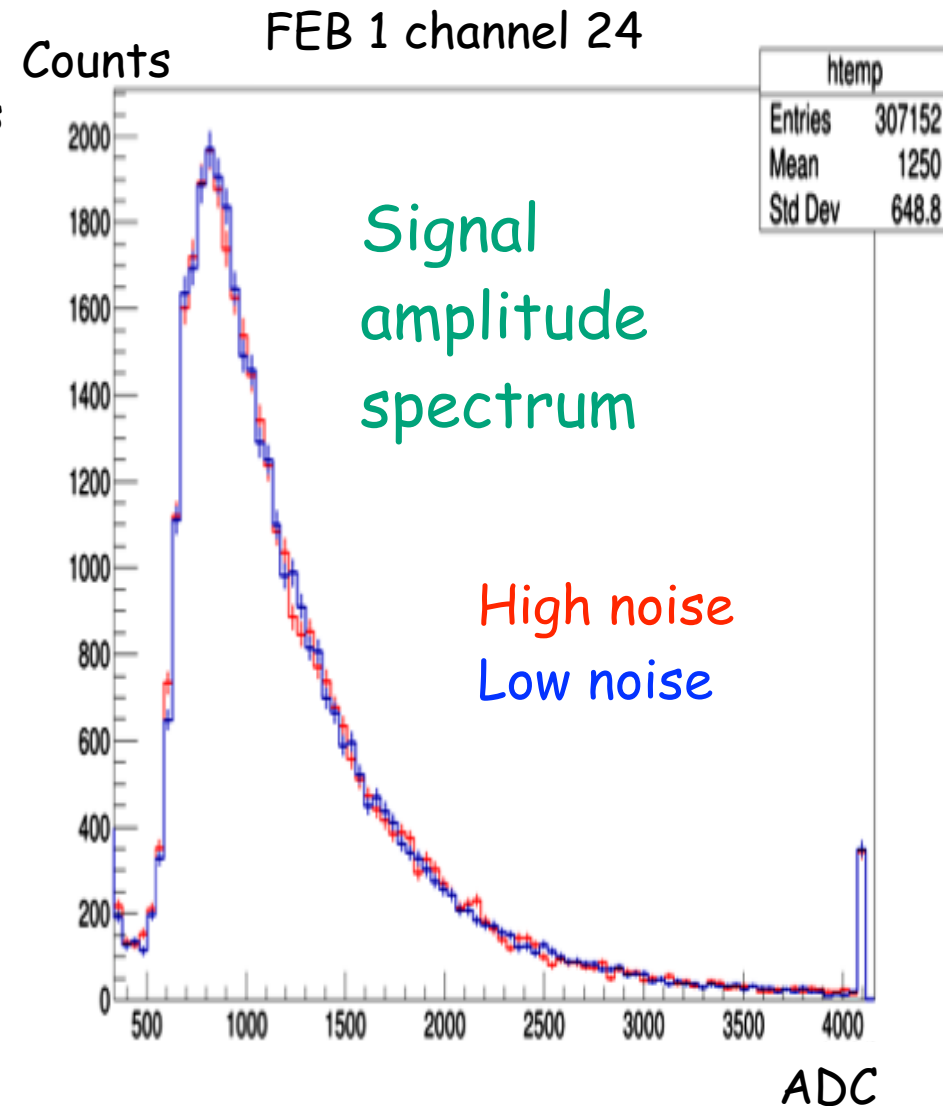


# Measures

- Two types of run (both use cosmic rays as source):
  - Measures of tagging efficiency
    - Added benefit of emulating realistic running condition, checking for dark or other noise out of spec on each SiPM board
    - Trigger given by hodoscopes
    - Reference ORM's have known efficiency
    - ORM to test is mounted in central module
    - Typical efficiency is 93%
    - Discriminator threshold as low as possible, such that rate < 30-40 kHz total, 10 kHz per channel (maximal throughput supported by FEB)
  - Self triggered
    - Trigger given by ORM (no external validation)
    - Measurement ensures good fiber-SiPM alignment achieved, sufficient Photon Detection Efficiency in each SiPM spanning full dynamic range of light output
    - Threshold just above pedestal.
- Personally tested a total of 56 ORM's out of a total of 300 to be mounted in the whole side CRT

# Noise Problem (solved since July 1st)

- With SiPM HV off, see non-zero trigger rate though spectra show only pedestal
- Source seems to be CAEN provided power supplies
  - Switched source (as opposed to linear)
  - Moving the "bricks" significantly improved or worsened noise rate from ~few Hz to 40 kHz (max FEB rate) at lower discriminator thresholds
  - Noise affects signal only slightly (see plot), main issues are rate and susceptibility.
- Susceptibility seems to depend on system configuration
  - With simplest possible configuration consisting of 1 FEB, 1 ORM, 1 network connection, 1 Power Supply (used in previous tests), system seems quiet
- Learned some important lessons relevant for the full CRT system: we really need to be careful with grounding





# Performed activities

Help solving the ground loop issue (see previous slide) and ORM testing

Additions to the DAQ GUI (easy run config., metadata in root file,...)

