JLab SoLID ECAL Test Beam Run Plan

Overview and Goals

The goal of the beam test is to assess the performance and determine the energy resolution of electromagnetic calorimeter hardware under development for the Jefferson Lab (JLab) Solenoidal Large Intensity Device (SoLID) program. The calorimeter features preshower blocks made of scintillator, and Shashlyk-type shower units that are alternating layers of lead and scintillator. The shower units are wrapped in light-tight paper and are taped, allowing for safe handling. Lead blocks are also part of the setup. These items are detailed in the Technical Statement of Work and Hazard Analysis forms.

We will utilize the FTBF Cherenkov detector for PID purposes; we are mainly interested in electrons, though pions are useful as well. We plan to run at a number of beam energies from 1–16 GeV.

Run Plan

We plan to take data at beam energies of 1, 2, 4, 6, 8, 10, 12 and 16 GeV. The run plan, broken down by day and shift, is indicated in the table below. In each 6-hr shift, a given beam energy in GeV is indicated unless otherwise noted.

Installation and ORC

On the first day (Wednesday January 13), we will install our detector system on the motion platform. In the afternoon, we will have our Operational Readiness Clearance Review.

Beam Energy Scan

To confirm our estimations, we plan to take data at each of our chosen beam energies in a single 6-hour shift. We aim to take 45 mins of data at each beam energy on the first shift.

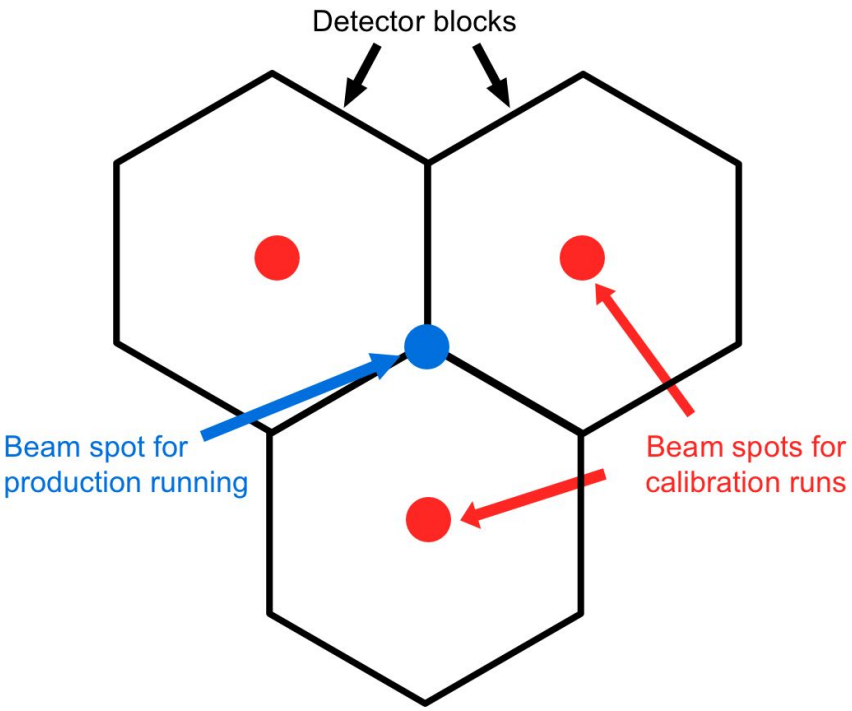
Calibration Data

We will take “calibration” runs to assess how the detector responds to different beam alignments, where we align the beam at the center of each of the 3 blocks and take data *without* the Cherenkov in the trigger, see the figure below. We will use the pion response to determine the ADC-amplitude gain-matching coefficients for the detector. The plan for these runs is as follows:

NOTE: Remote motion of the table on which the detector is placed will be important for minimizing/eliminating the need for controlled accesses for this run group.

Production Data

To mimic production running, we align the beam at ~1cm from the center of 3 blocks. Take data with a mixture of e-, pi-, etc. (Pion data are useful for SoLID too.) Make sure the Cherenkov data is in our data stream.



WEEK 1: 1/31/21–1/19/21							
Shift	**Wed 1/13/21**	**Thu 1/14/21**	**Fri 1/15/21**	**Sat 1/16/21**	**Sun 1/17/21**	**Mon 1/18/21**	**Tue 1/19/21**
08:00–14:00	Installation	Energy scan	1	16	16	16	6
14:00–20:00	ORC/ testing	Calib. runs	1	16	16	6	6

WEEK 2: 1/20/21–1/26/21							
Shift	**Wed 1/20/21**	**Thu 1/21/21**	**Fri 1/22/21**	**Sat 1/23/21**	**Sun 1/24/21**	**Mon 1/25/21**	**Tue 1/26/21**
20:00–02:00	4	8	8	10	12	12	12
02:00–08:00	4	8	10	10	12	12	12

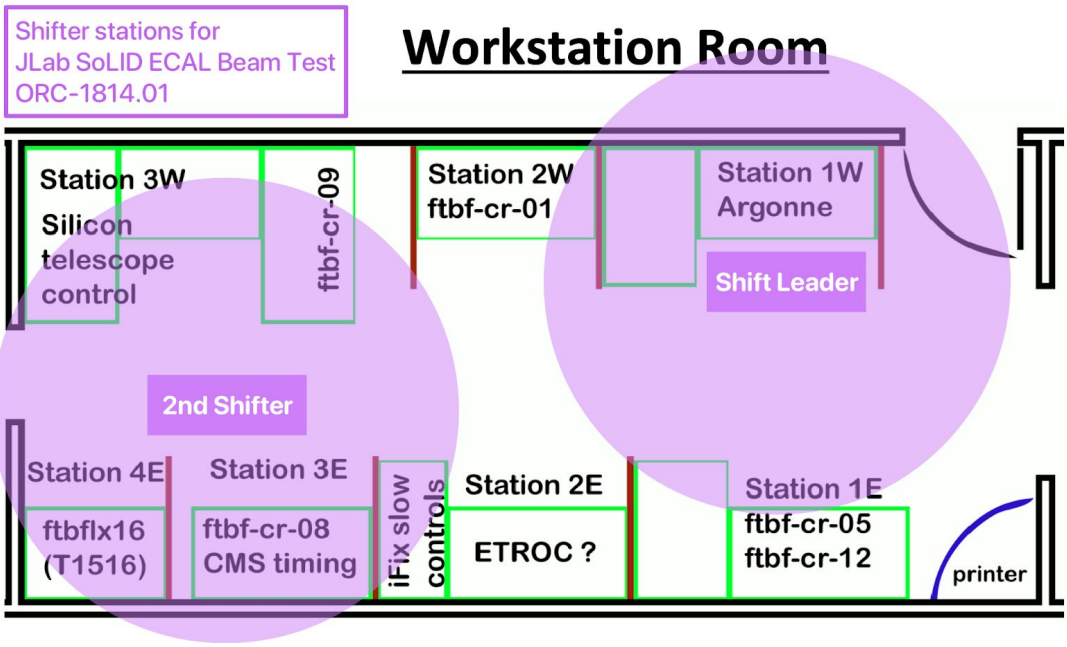
Utilization of the M-Test Control Room

We plan to have two shifters and one remote shifter. The roles are defined as follows:

- **Shift Leader:** Communicates with MCR and guides the acquisition of data.
- **Second Shifter:** Monitors data quality and manages data transfer to backup disks, both locally and remotely back to JLab servers.
- **Remote Shifter:** Monitors data quality.

The in-person shifters will occupy the Workstation Room as shown in the diagram below. The large circles indicate 6-ft diameter zones for the indicated person in order to indicate the physical distance requirement to reduce COVID exposure.

Shift Schedule



We have developed a schedule to fill each 12-hour shift block covering the two weeks of operation, dividing each block into two 6-hour shifts shown in the tables below. Each shift has two in-person shifters and one remote shifter. Wednesday January 13 is reserved for installation and checkout.

WEEK 1: 1/13/21–1/19/21								
Time	**Shift Type**	**Wed 1/13/21**	**Thu 1/14/21**	**Fri 1/15/21**	**Sat 1/16/21**	**Sun 1/17/21**	**Mon 1/18/21**	**Tue 1/19/21**
DAY 08:00–14:00	Leader	**NO SHIFTS**						Reimer
	Second				Manoj			
	Remote		David	David				
SWING 14:00–20:00	Leader							
	Second			Manoj		Reimer	Reimer	
	Remote				David	David	David	David

WEEK 2: 1/20/21–1/26/21								
Time	**Shift Type**	**Wed 1/20/21**	**Thu 1/21/21**	**Fri 1/22/21**	**Sat 1/23/21**	**Sun 1/24/21**	**Mon 1/25/21**	**Tue 1/26/21**
NIGHT 20:00–02:00	Leader		Reimer	Reimer	Reimer			
	Second							
	Remote			David	David	David		
OWL 02:00–08:00	Leader							
	Second							
	Remote							