

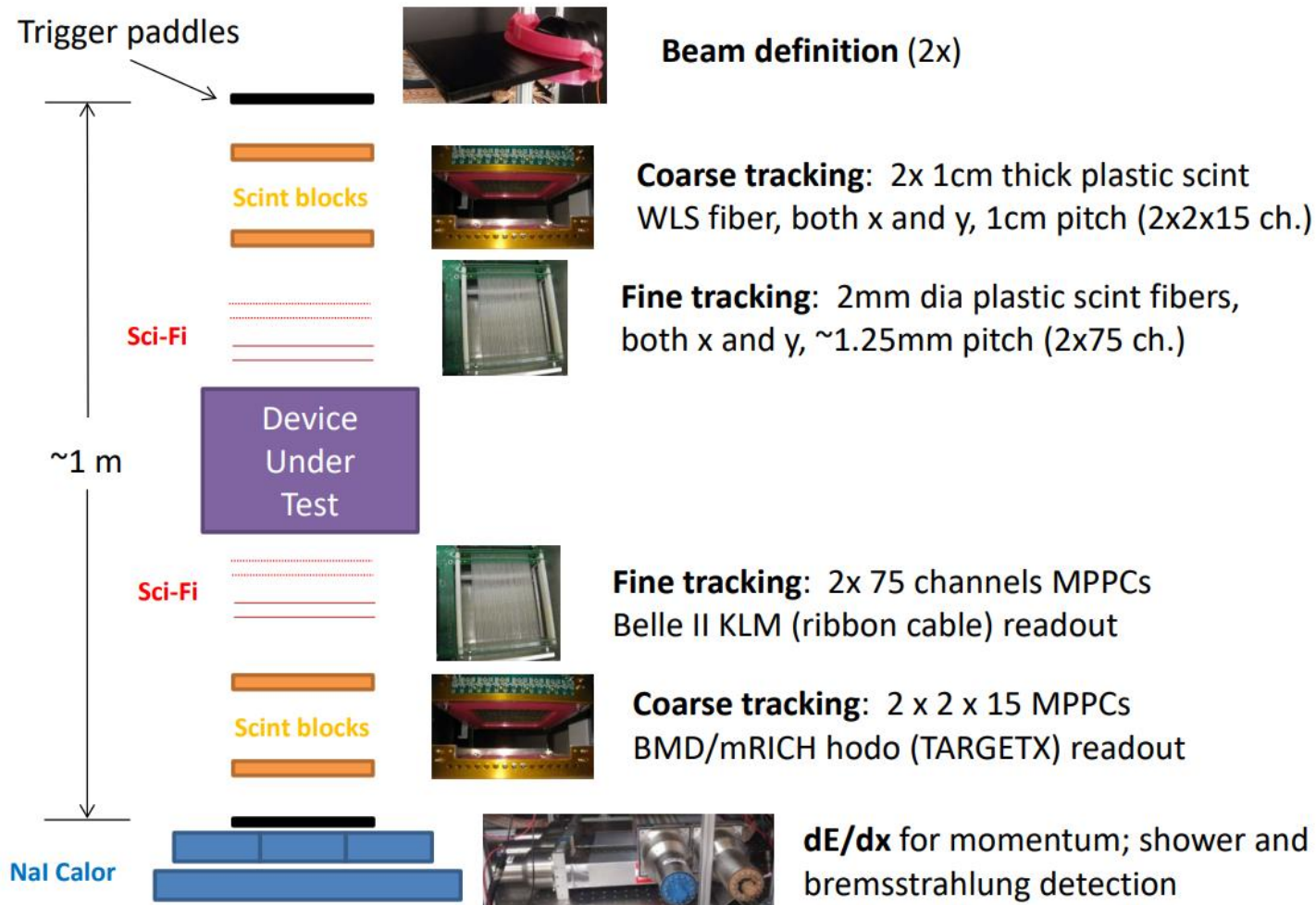
SiPM Readout for Muon Detection

ALEZANDER PAUL

A solid orange horizontal bar at the bottom of the slide.

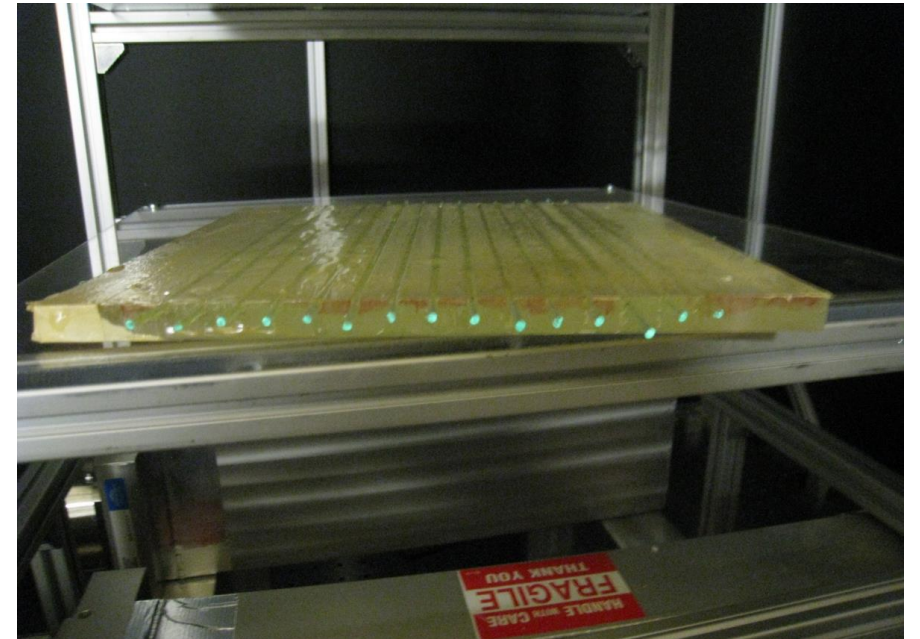
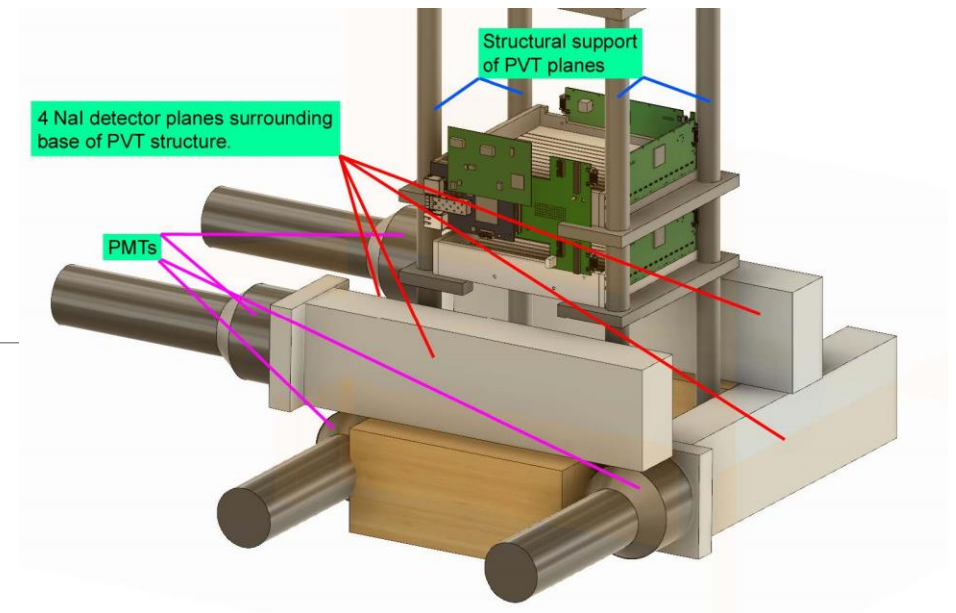
Motivation

- SiPM's used in the Hawaii Muon Beamline v3 (HMBv3)
- Tracking the path of the muon before hitting the device under test and the NaI Calorimeter
 - Muons coming from space



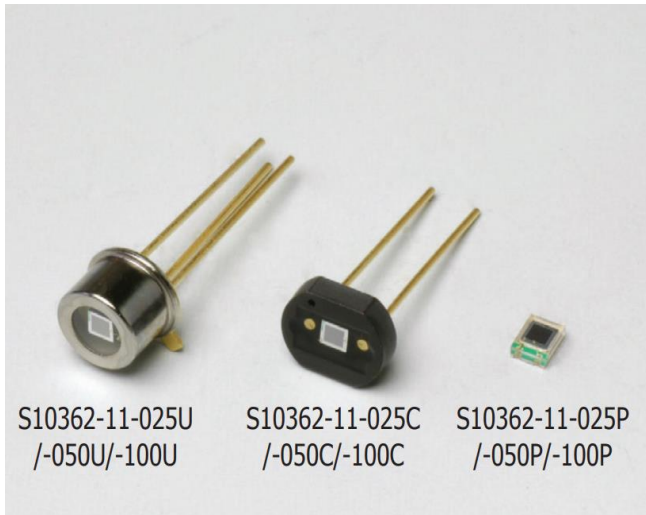
Motivation

- Muon hits the scintillating fiber, causing a photon to propagate
 - SiPM at the end used to measure this photon
- Need a board to test if the SiPM works before placing on HMBv3

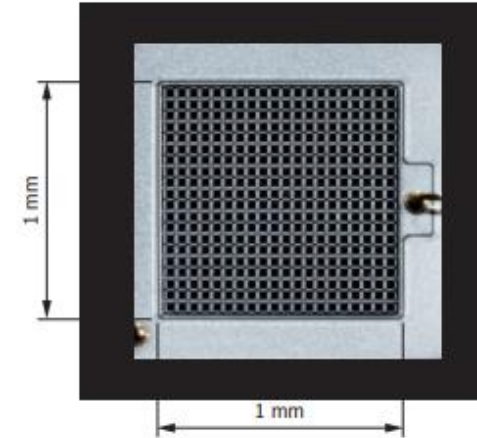


SiPM Specifications

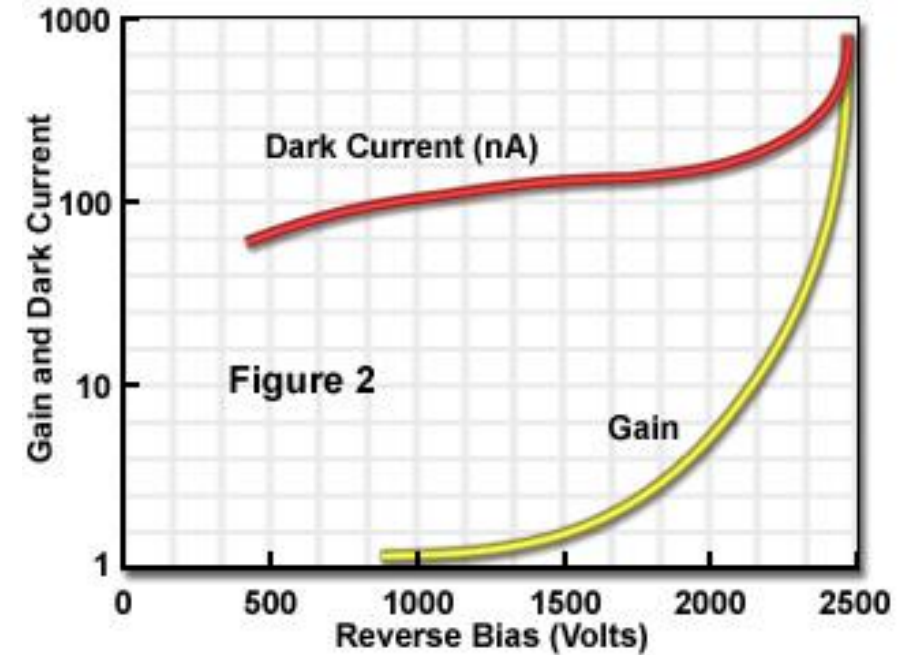
- SiPM: Hamamatsu MPPC S10362-11-100P
 - $V_{op} = 72.31V$
 - Dark Count: 256kHz (at 25°C)
 - # of pixels: 100



☒ Macro photograph of MPPC



Avalanche Photodiode Gain and Dark Current



Current Problems with SiPM Readout

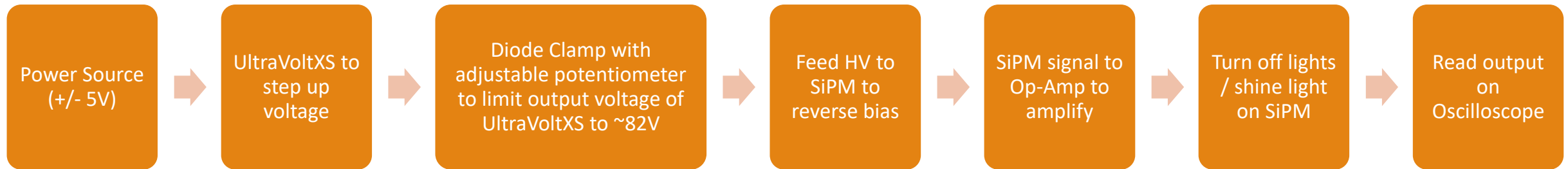
- MPPC requires a high voltage to reverse bias ($\sim 72\text{V}$)
- Current PCB's in the IDLab for SiPM readout can be improved
 - One that works, but the 72V bias comes from an external power supply
 - One designed to have the 72V bias internally, but it does not work
 - Still have not figured out why exactly that is
 - Has also been butchered trying to fix it
- Stepping stone to create one that works without external power supply
 - Working on breadboard setup
 - Eventually will be made into a PCB

HV Source Specifications

- High Voltage Source: UltraVolt XS
 - $V_{in} = 5 \pm 0.5 \text{ V}$
 - HV Output: 0-100V programmable
 - 0-2.5V adjustable pin
 - Output Power: 100 mW



Implementation



Circuit Diagram

