

Characterization of Scintillator and Calorimeter PMTs

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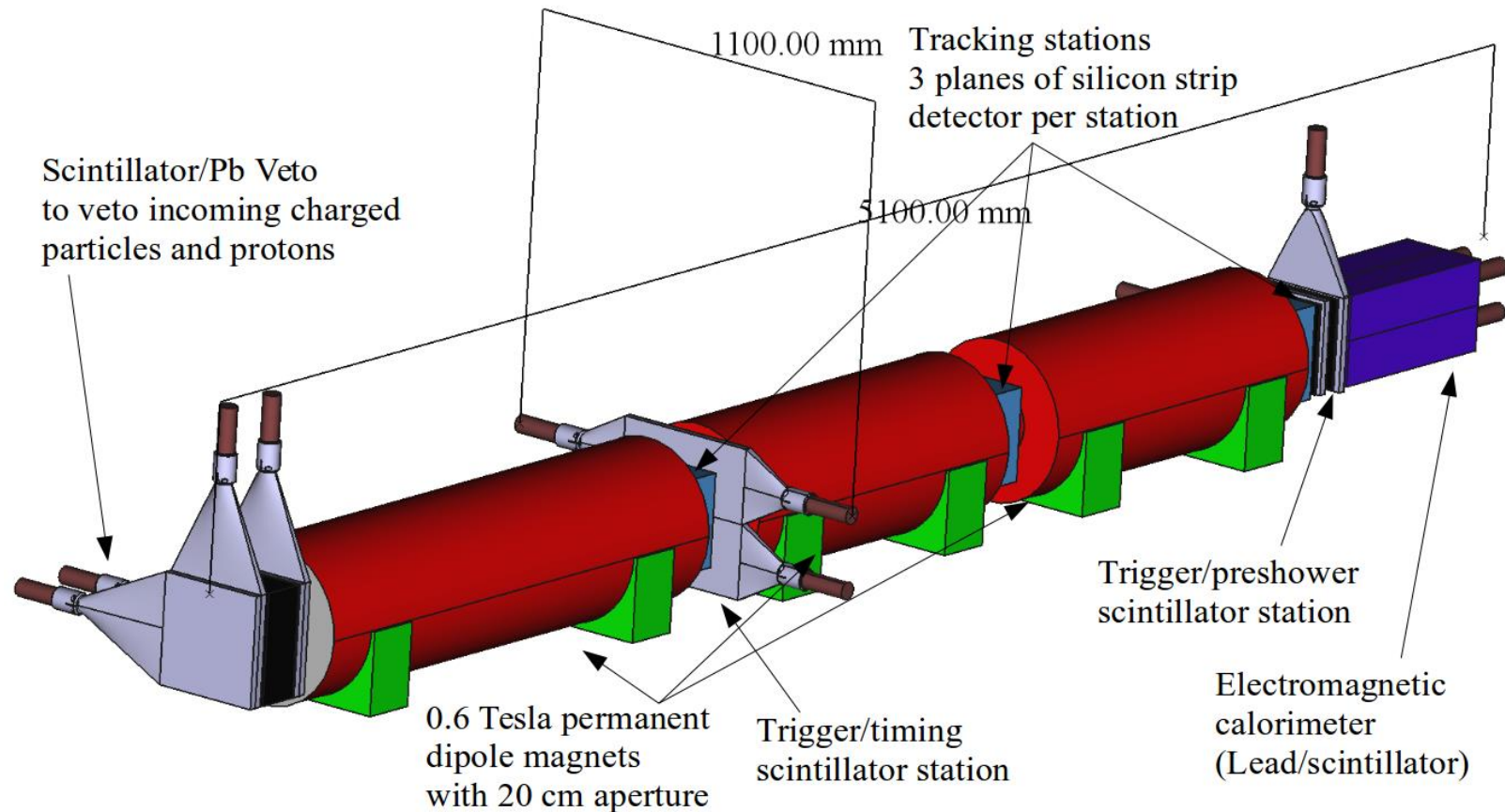


Experiment

- Goal: To discover light, weakly-coupled new particles such as:
 - Dark photons
 - Dark Higgs bosons
 - Heavy neutral leptons (sterile neutrinos)
 - Axion-like particles
- How it Works: Light, weakly coupled particles are produced with low p_T in pp scattering, travel tangential to IP, and decay into visible products within the volume

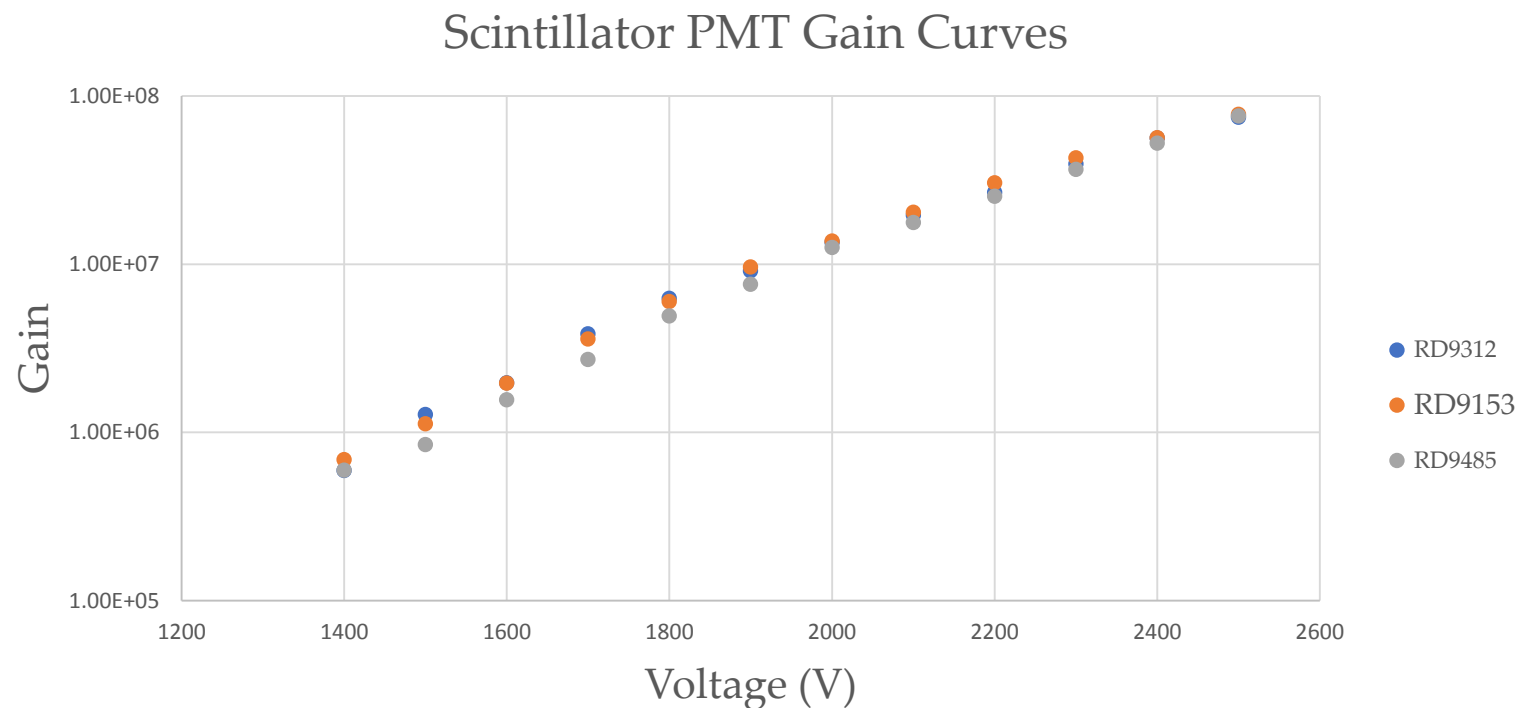
FASER Detector

- Located 400 meters away from the line of sight of the ATLAS IP

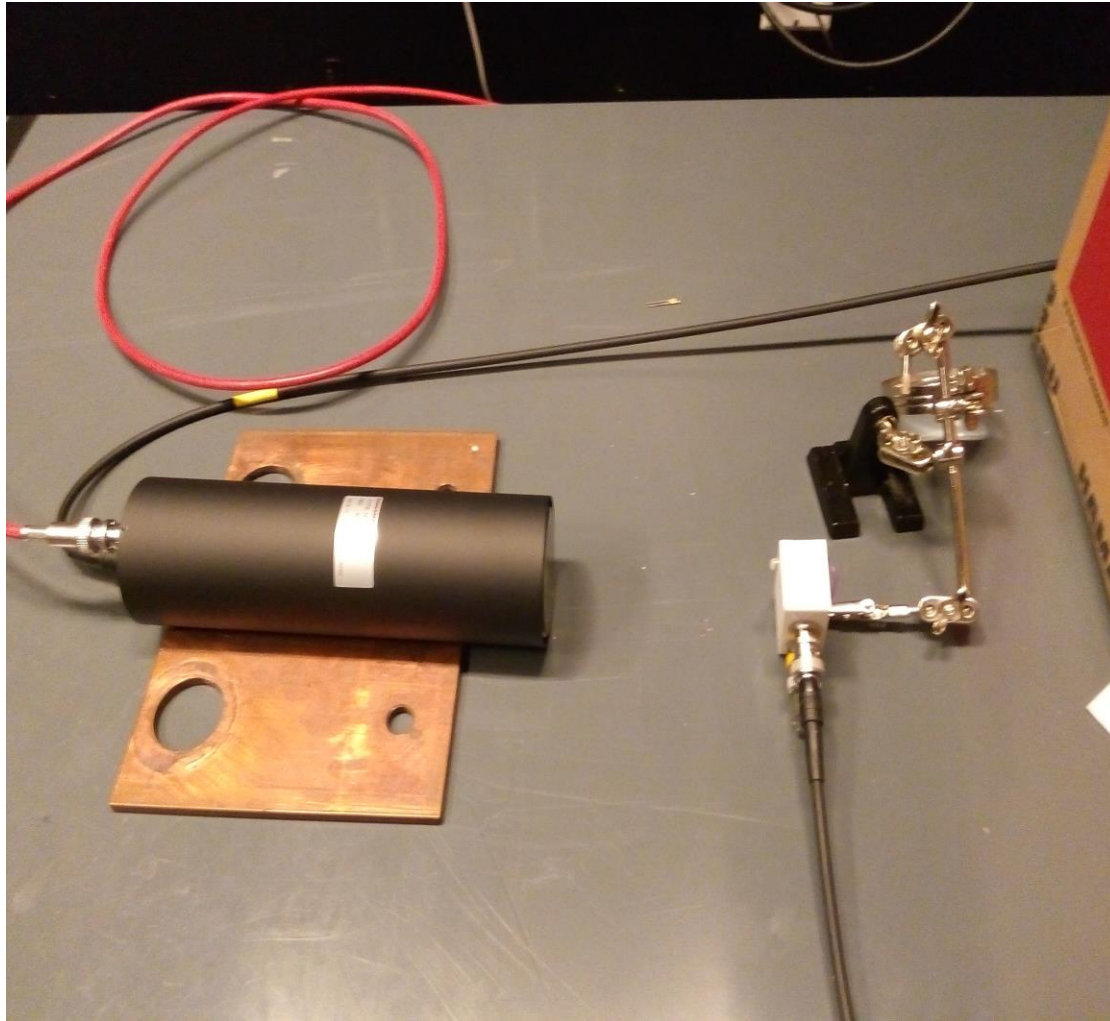


My Project

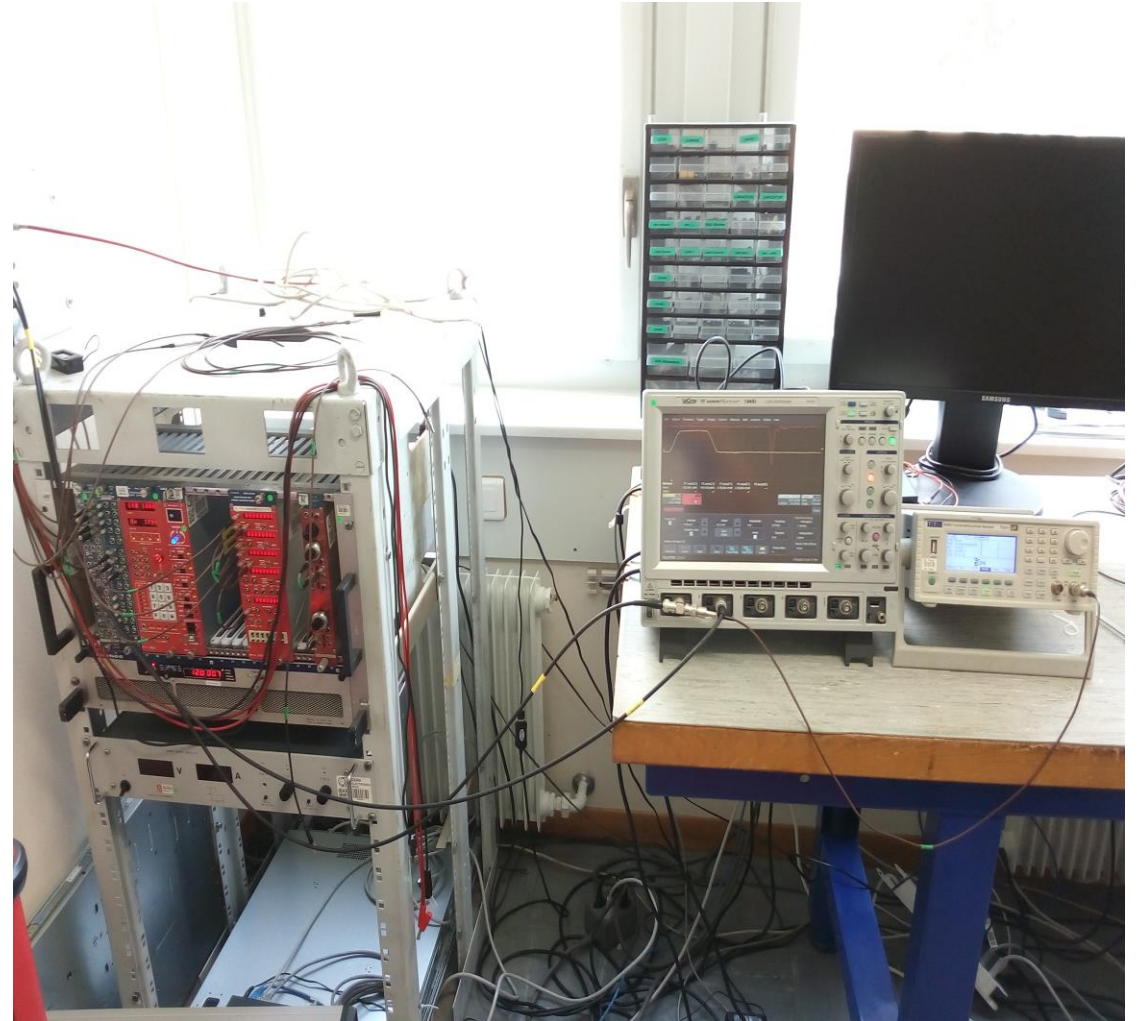
- Goal: Measure the gain, linearity, and quantum efficiency of scintillator and calorimeter PMTs
- What I have done so far: Scintillator PMT gain measurement



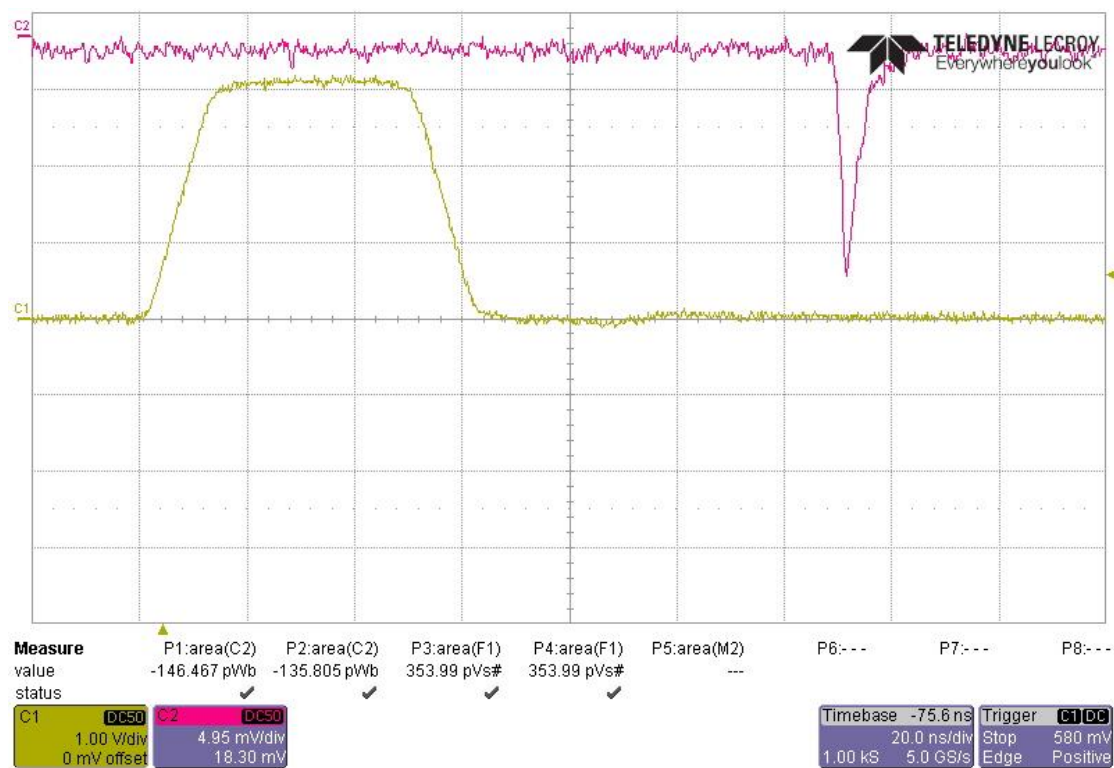
Scintillator PMT and LED light source



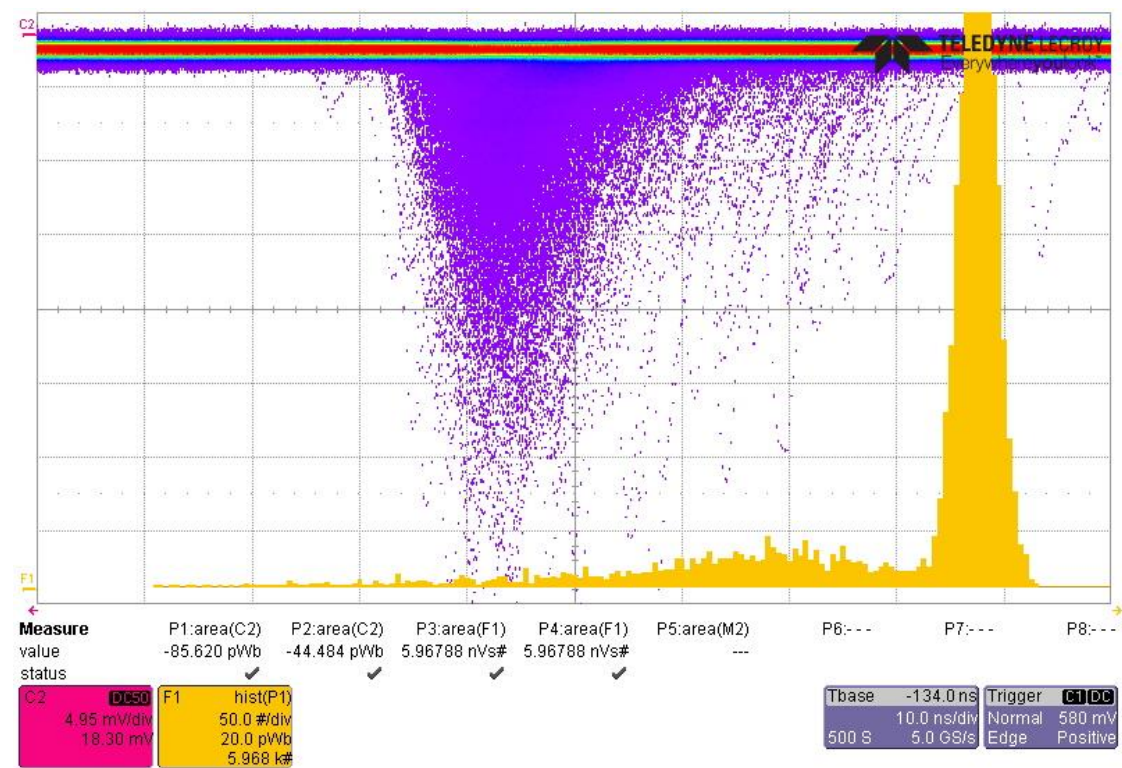
HV Supply, Oscilloscope, and Pulse Generator

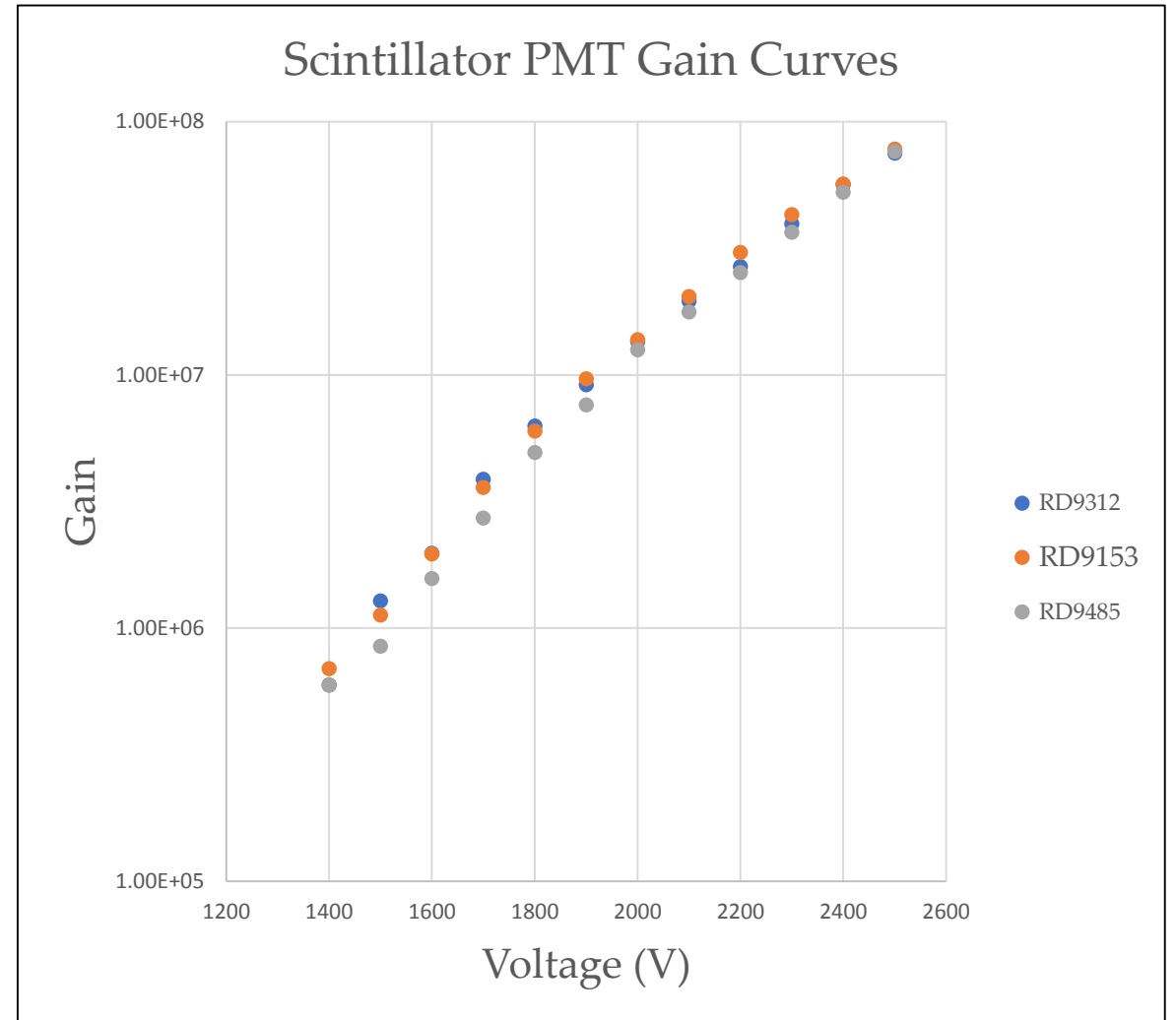
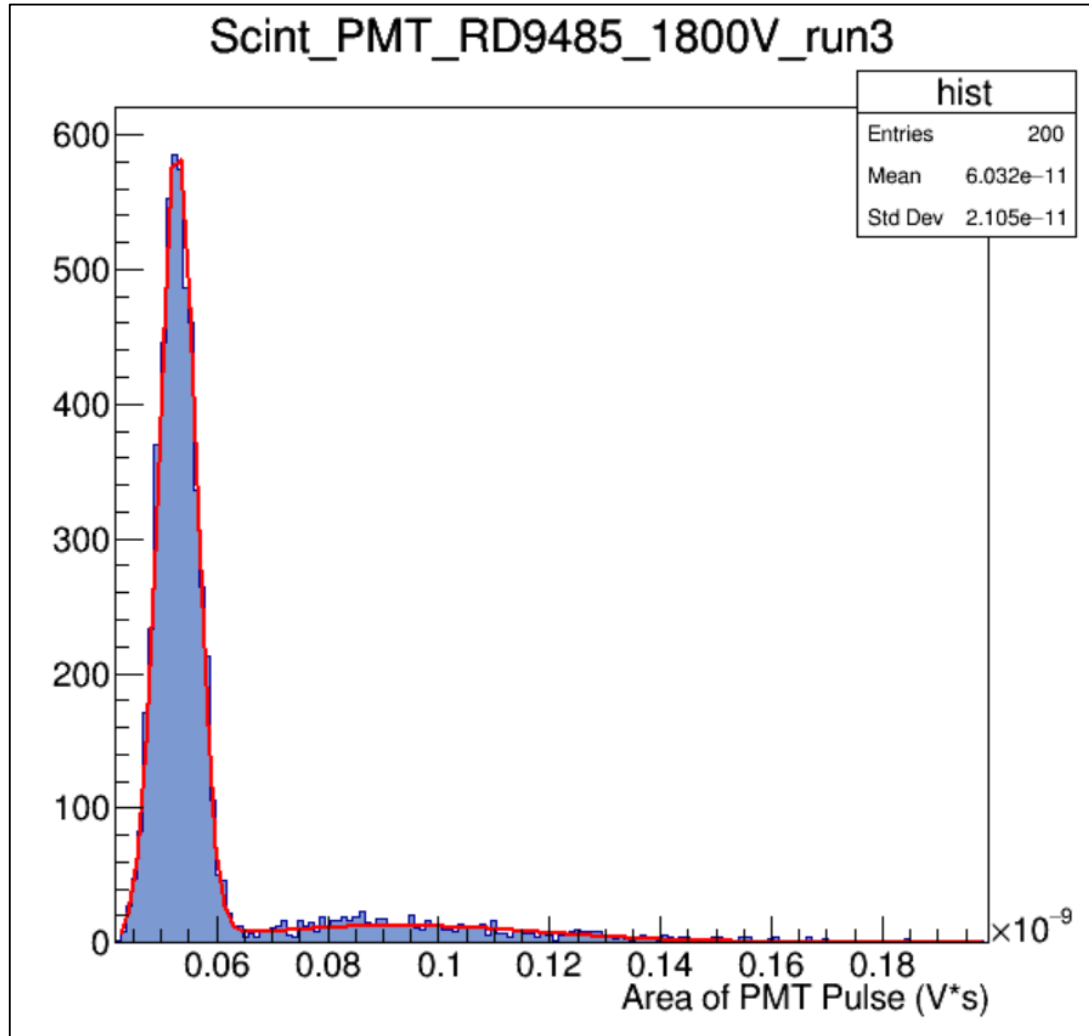


Typical PMT Response



Histogram of PMT Pulse Area





Future Steps

- Measure calorimeter gain, linearity, and QE
- Measure scintillator linearity and QE
- Replace oscilloscope with digitizer and automate process further
- Measure cosmic rays using simple scintillators triggers and FASER calorimeter with calibrated PMTs