# CMS HGCal Precision Timing

- The CMS High-Granularity Calorimeter Prototype consists of layers of Tungsten asborber + silicon sensor active medium
  - Silicon sensor detectors EM shower secondary particles

- Purpose of current testbeam:
  - Understand precision timing capabilities of silicon sensors
  - **How do independent time measurements that sample different parts of the EM shower add up?**
    - Add in a statistically independent fashion?
    - Or are time jitter among channels highly correlated
    - Do timing measurements along the longitudinal direction complement timing measurements in the transverse dimension?

Si Xie

Caltech

Custom PCB design

- Silicon sensor is glued to a custom PCB design
- Each hexagonal sensor is instrumented with fast amplifiers and read out by a 32-channel DRS board via SMA cables
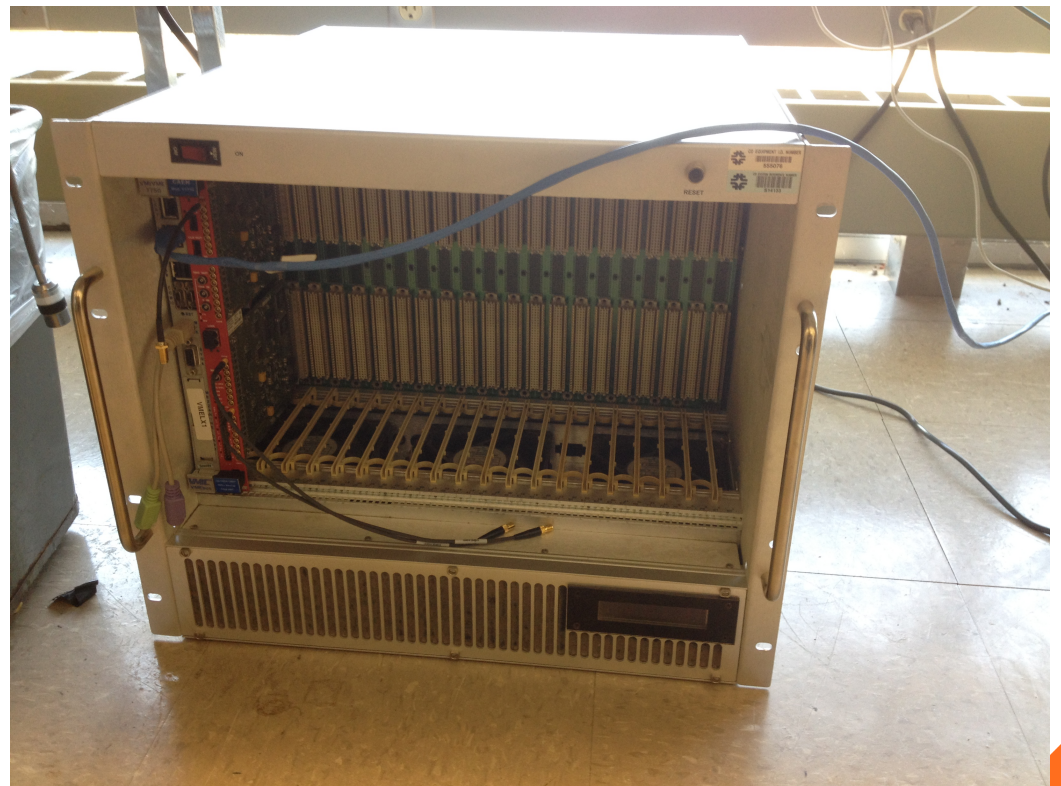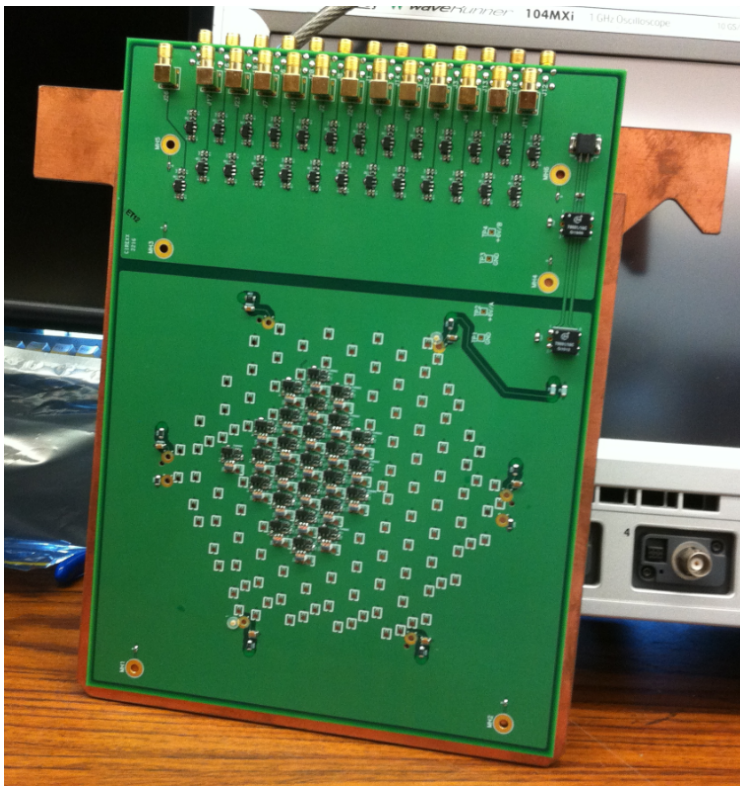
Timing Measurements

- Time measurements are made with respect to a high precision MCP-PMT (<10ps precision) that also samples the shower, behind the silicon sensors
- Preliminary data looks reasonable :
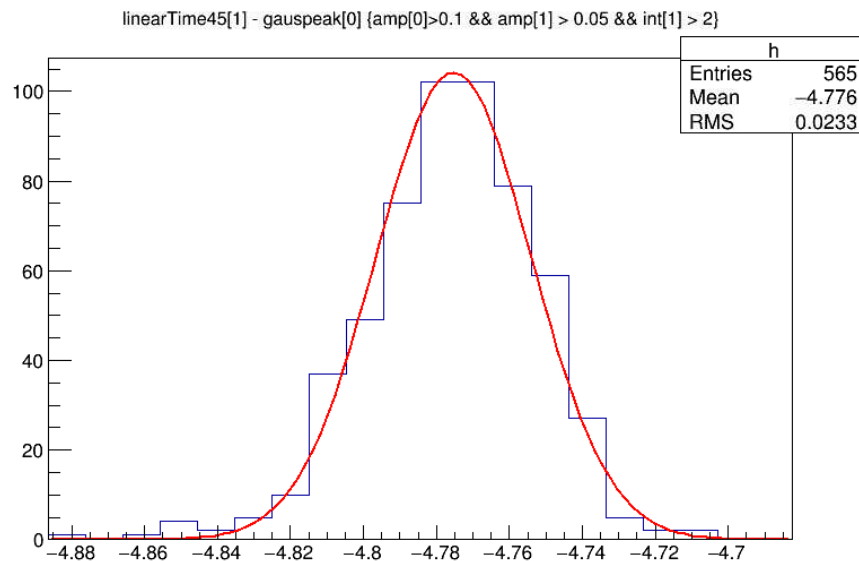
- Analysis on the impact of additional transverse and longitudinal timing measurements are ongoing

Si Xie