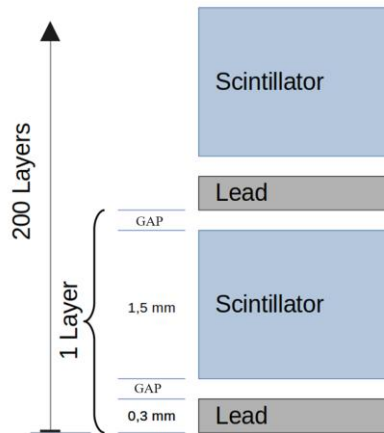
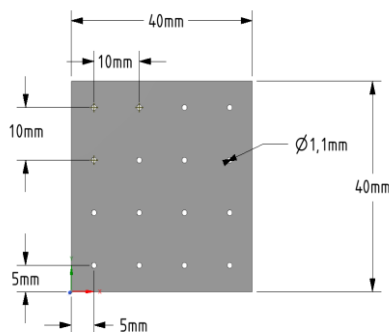
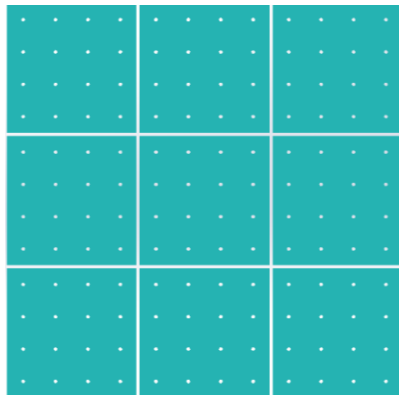


# Preparation for the test of the 3x3 E-CAL prototype with cosmic muons

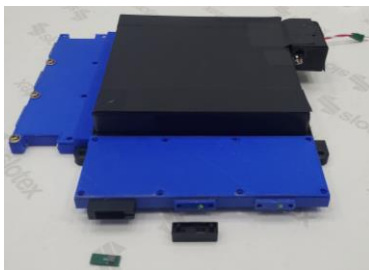
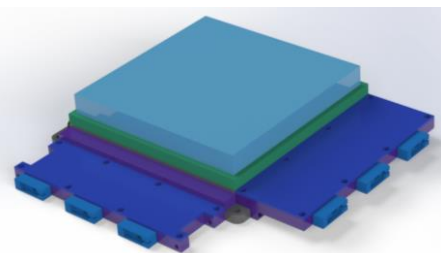
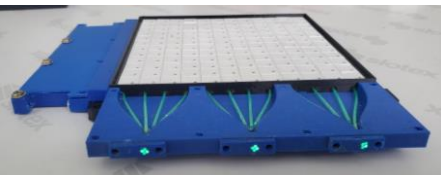
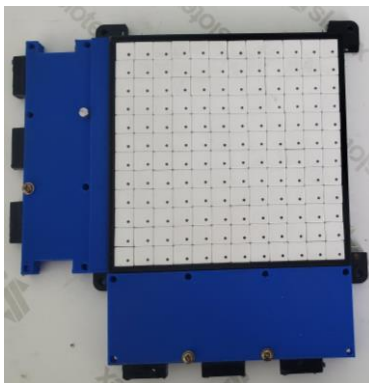
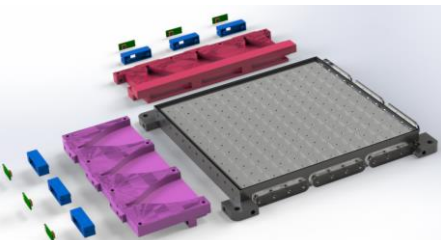
V. Baranov, D. Chokheli, A. Simonenko and I. Zimin

For R&D/Module/Electronics/Mechanics meeting  
(focusing on SPD experiment)

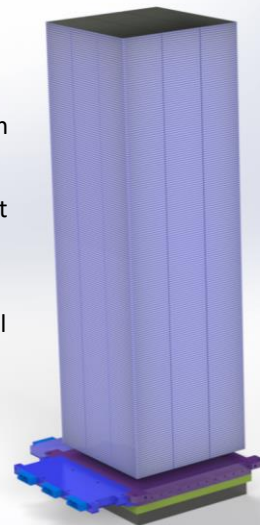
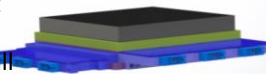


- 9 scintillator tiles with 40x40x1.5 mm in size per layer
- 9 pure lead tiles with 40x40x0.3 mm in size per layer
- 200 layer of scintillator and lead tiles
- Length of scintillator/lead “sandwich” is less than 400 mm
- Total length of module is 530 mm
- D1 mm Kuraray Y11 WLS fibers cross all scintillator and lead tiles in holes along the module
- 16 WLS fibers from one column (based on plate size – 40x40 mm) bundled in one side
- 6x6 mm SiPM/MCCP attached to each WLS bundle

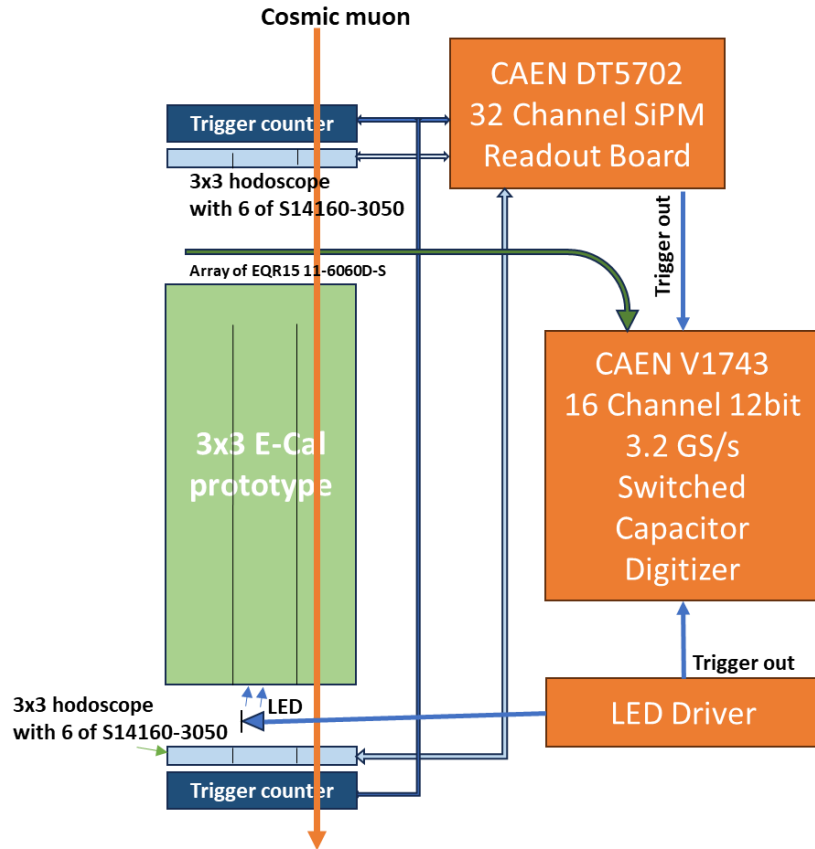
# Preparation of the 3x3 hodoscope with 40x40 mm cell to detect cosmic muons



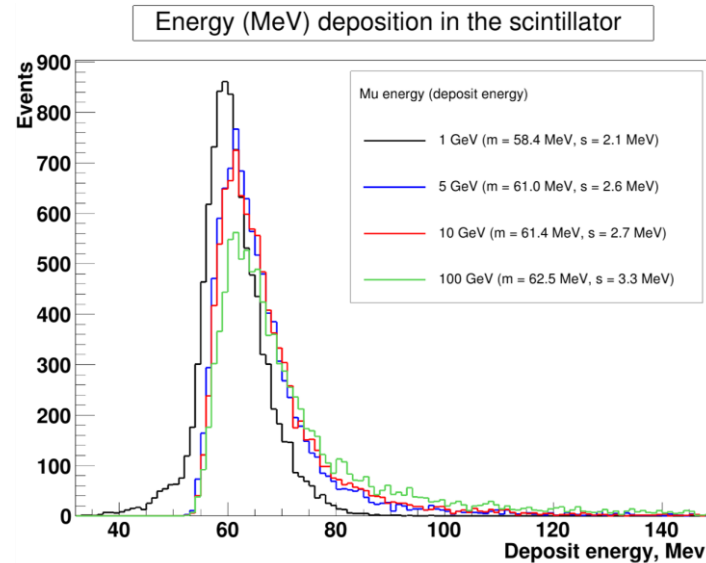
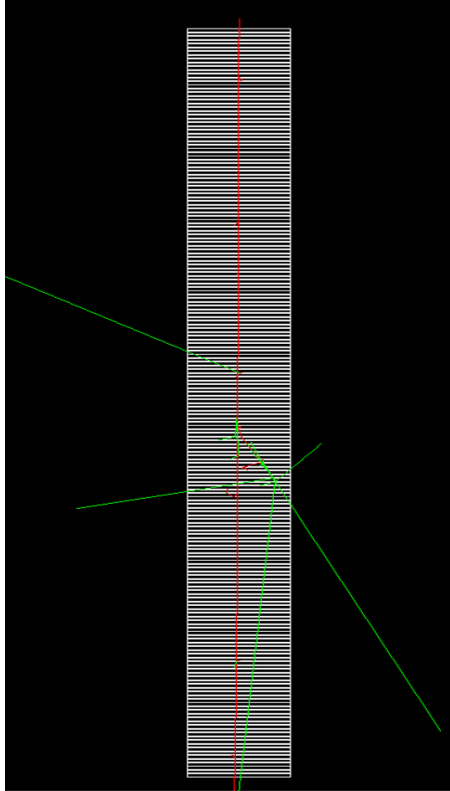
- 3x3 hodoscopes designed and created
- The cell dimension of the hodoscope is 40x40 mm to fit the E-cal column size
- The corresponding area of the cosmic muon passage will be selected by coincidences of X and Y axes created by WLS fibers
- These hodoscopes created using 120 of 10x10x10 scintillation cubes designed for T2K experiment
- D1.2 mm Kuraray Y11 fibers inserted into the holes and bundled by 4 on once side
- Two 120x120x20 scintillation plates will create common cosmic trigger
- 6x2=12 of 3x3 mm Hamamatsu S14160-3050 MPPC/SiPM attached to the hodoscopes and 1x2=2 of it should be attached the trigger counters.
- 9 of 6x6mm EQR15 11-6060D-S SiPM-NDL attached to the 3x3 e-cal prototype
- The hodoscopes with attached to it trigger counters will be placed over and under E-Cal prototype to properly trace the cosmic muon passage



# Proposal of the DAQ for a cosmic test for the 3x3 E-Cal prototype

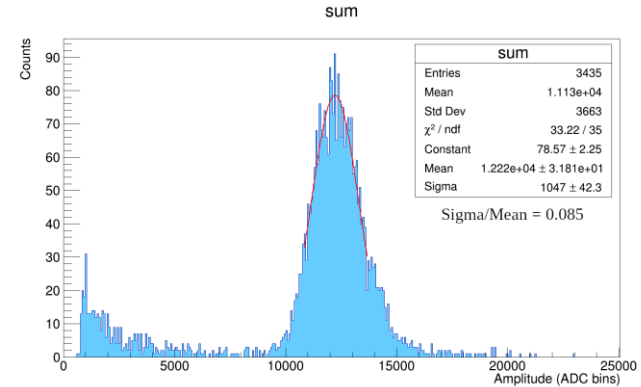
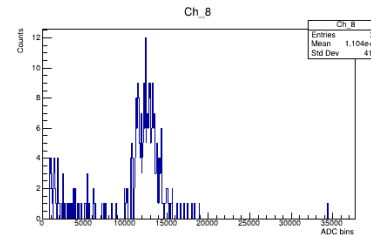
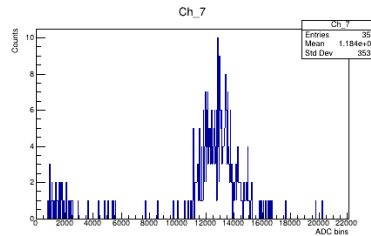
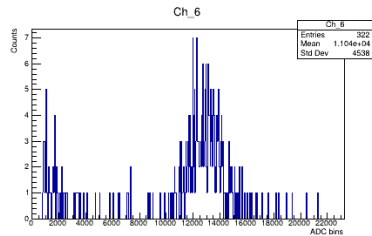
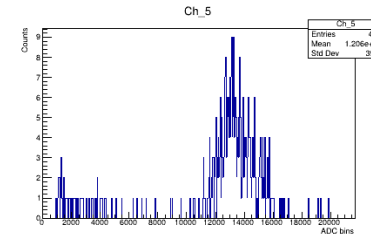
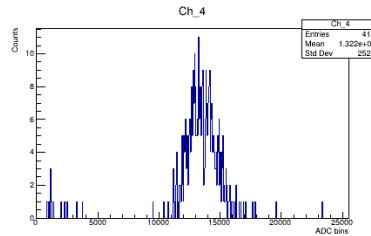
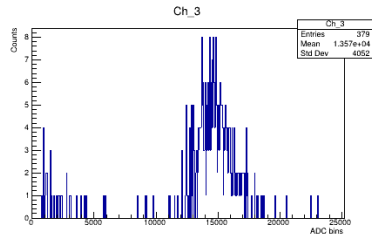
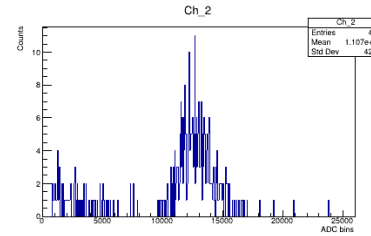
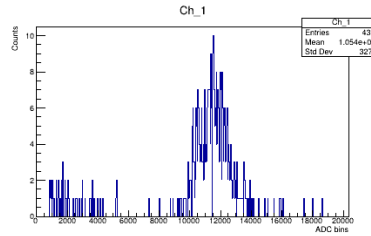
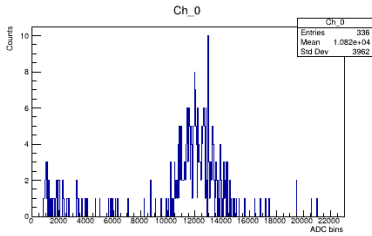


- EQR15 11-6060D-S SiPM-NDL attached to the 3x3 E-CAL prototype
- S14160-3050 MPPC/SiPM attached to the hodoscopes and trigger counters
- CAEN DT5702 32 Channel SiPM Readout Board provides control for trigger counter and hodoscope SiPMs
- CAEN V1743 16 Channel 12bit 3.2 GS/s Switched Capacitor Digitizer will collect data



- one 40x40 mm column is considered
- Muon entries column on the center of it (red line)
- Muon energy are 1, 5, 10 and 100 GeV
- Around 60 MeV is deposit by muon to e-cal scintillators

# Preliminary cosmic results with trigger counter only



- The cosmic run with setup described in previous slide
- **Difference: 3x3 hodoscope absent in this run!**
- 5 days continuous run counted about 20 000 events
- Was used the offline technique for separation for the events passing only one column
- LED flashing light allowed to monitor output
- Temperature also controlled

- The aim of this test is to study the cosmic muons response passing with one column only in comparison when it passes two or more columns of the 3x3 E-CAL prototype
- We preparing the design of cosmic test for 3x3 ECAL prototype using 3x3 hodoscope with 40x40 mm cell size and based on 12x12 10x10x10 mm cube array
- We hope that the setup would be ready by the end of this week
- Once setup ready, it will be placed in a climate-controlled room to hold the temperature constant at 20 degree by Celsius
- We expected that the cosmic run will be last continuously for about one or two weeks to collect sufficient amount of data

