ECal Status

Dubna
October 2020

Modules production

Protvino

Production started

To the April 2021 - 440 modules

ТЕНЗОР

Production started

To the April 2021 - 250 modules

8 sectors out of 25

Modules production

China production site

China Contribution

Modules production (50%)
Analog boards (HV + amp.) production (50%)

Institutes:

Tsinghua University (60%)

Huzhou University

Shandong University (20%)

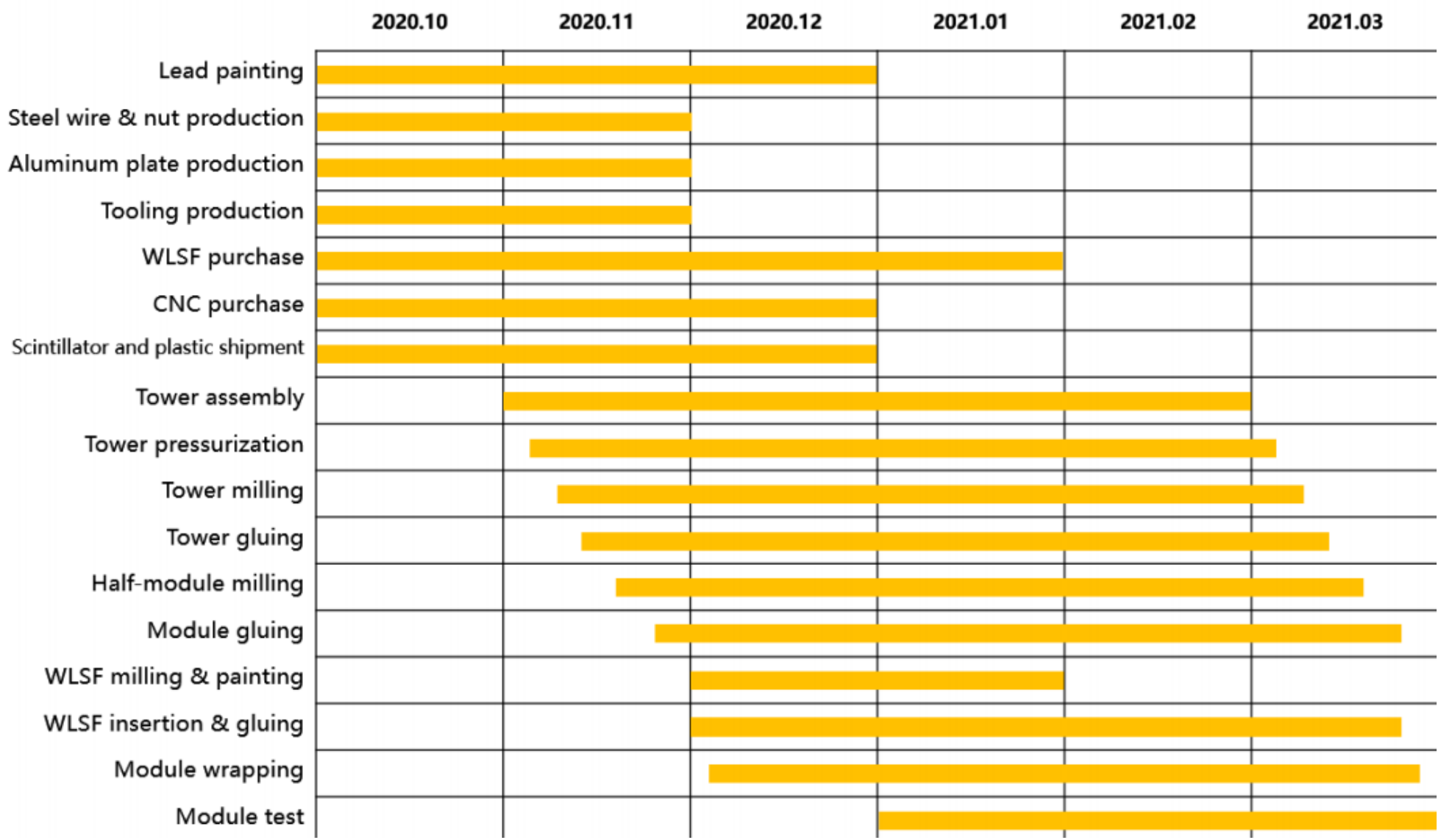
Fudan University (10%)

University of South China (10%)

If so! 16 sectors could be assembled

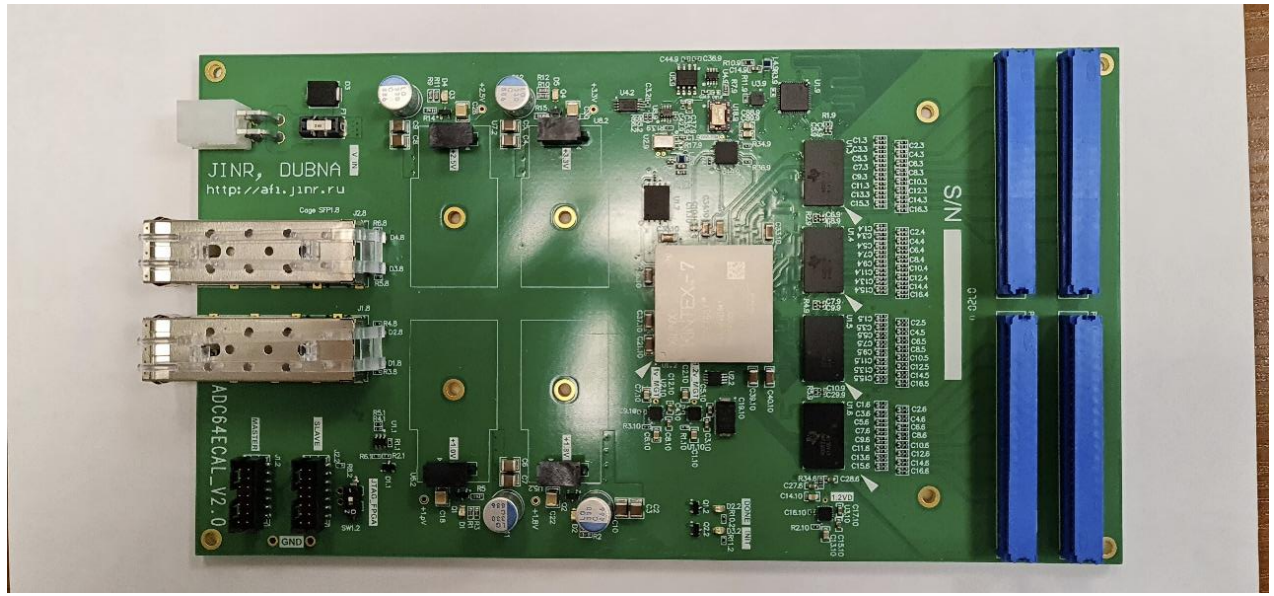
Modules production

Production Time line

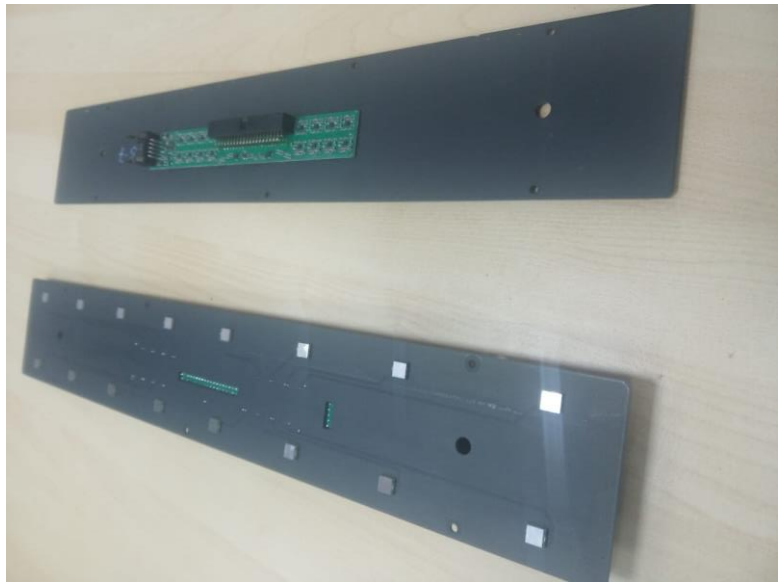


Electronics

ADC64 - 192 boards
for 8 sectors in production



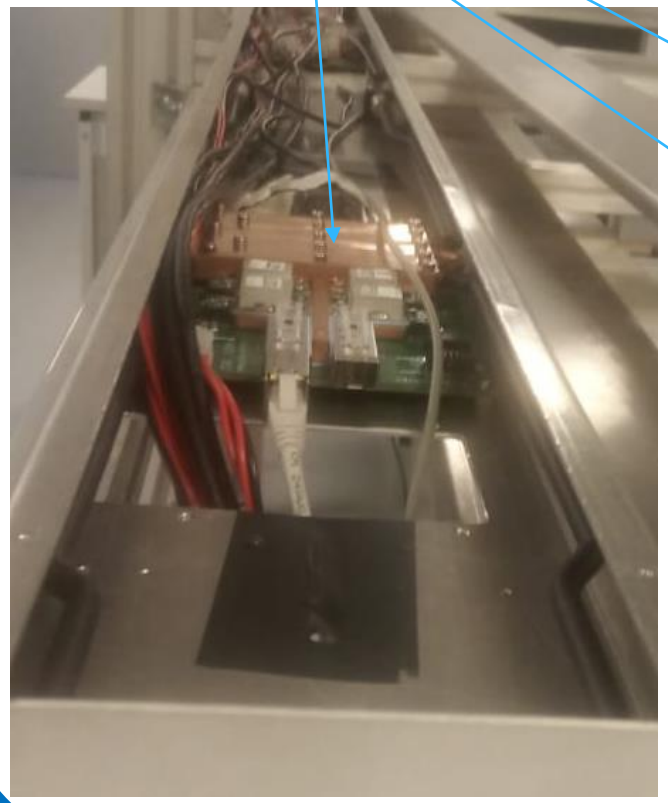
HV+amplifier+SlowControl – 800 boards
for 8 sectors in production



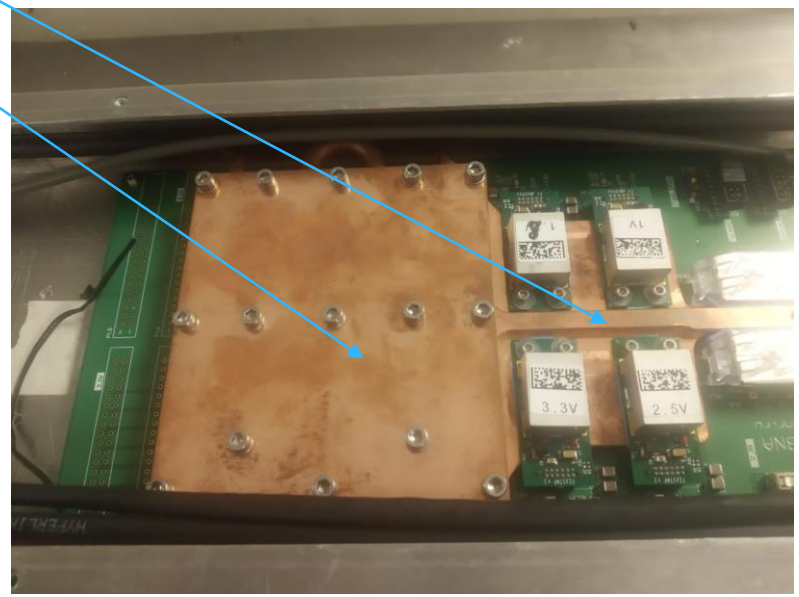
Production plans will be corrected when
China production rate will be demonstrated

Cooling system for ADC64

Internal part – cold insertion mounted inside barrel



In production

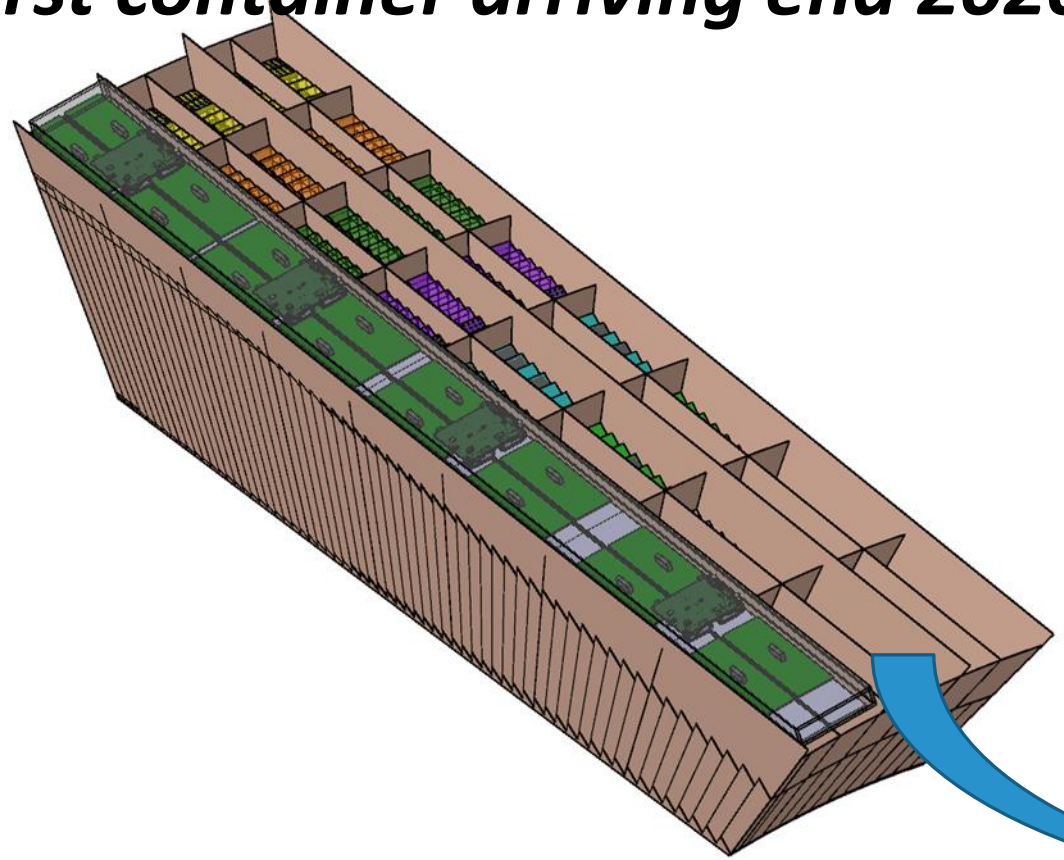


Vacuum pump station

Half-sector Container

in production

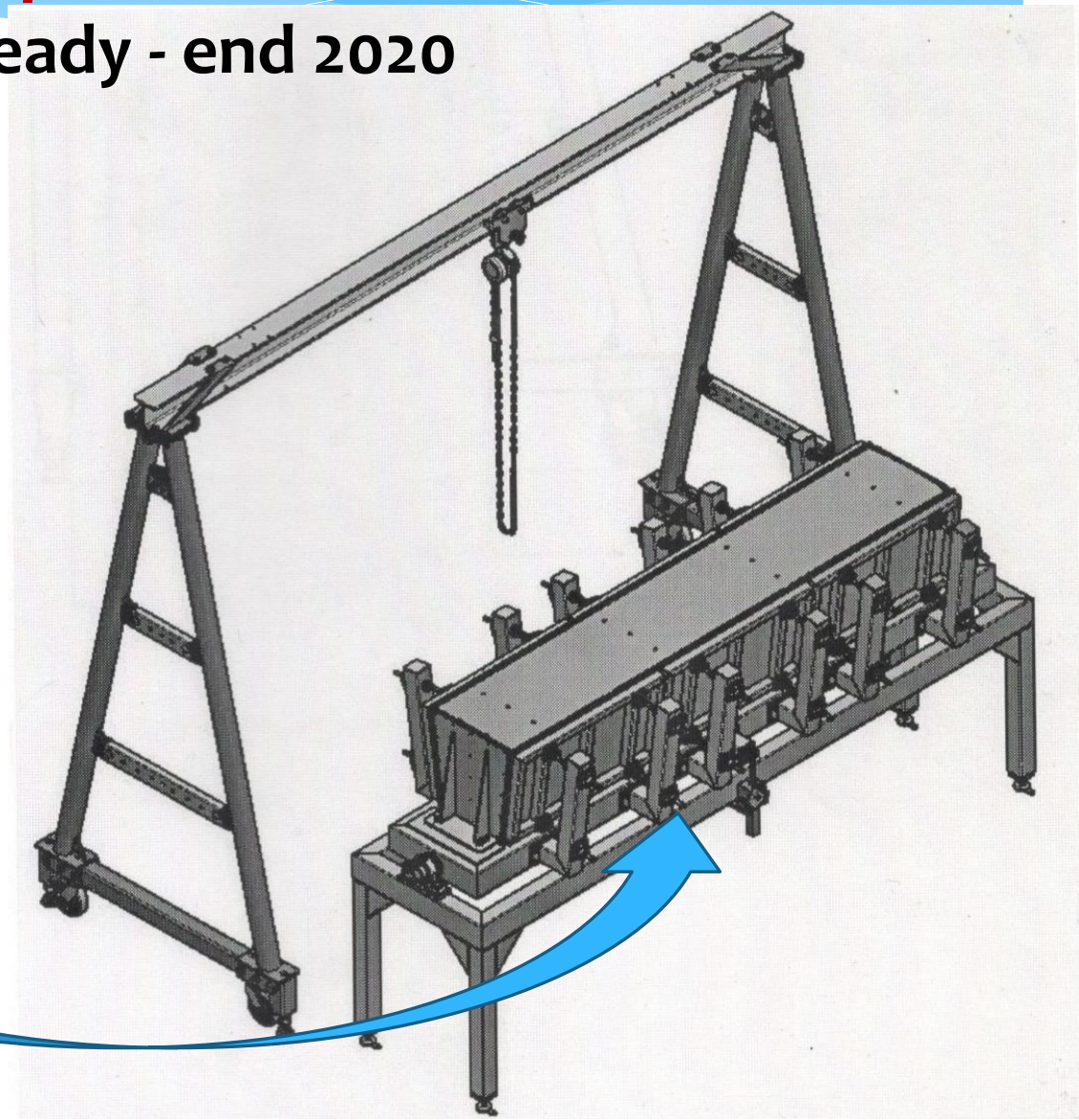
First container arriving end 2020



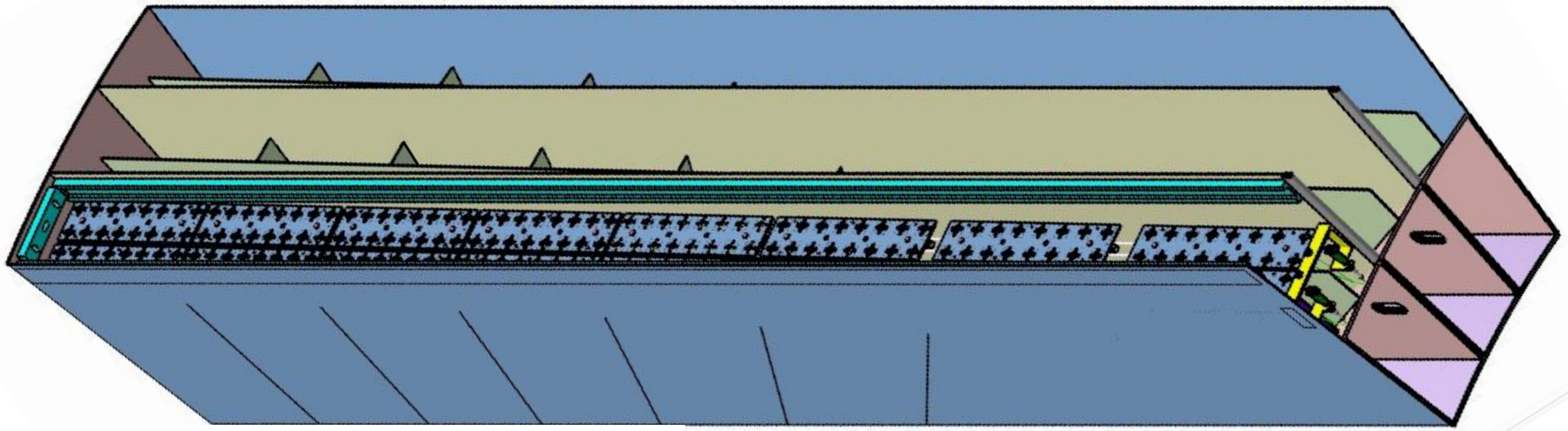
Slipway to assembly half sector

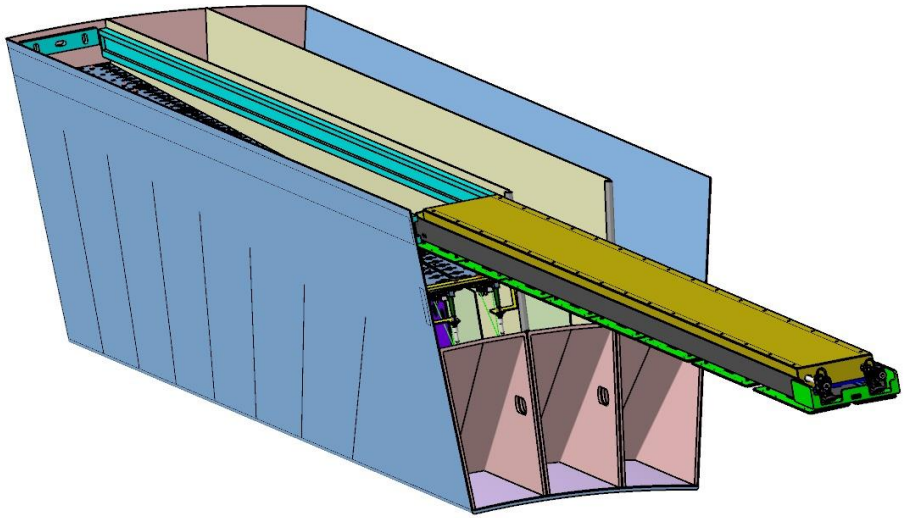
In production

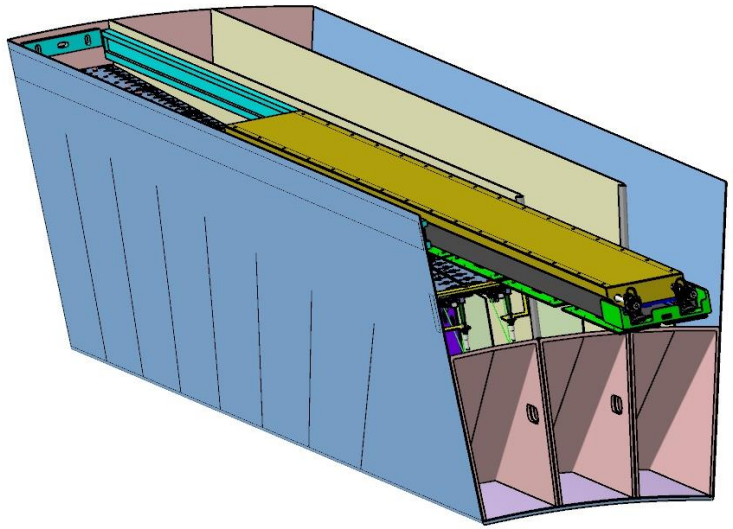
Ready - end 2020

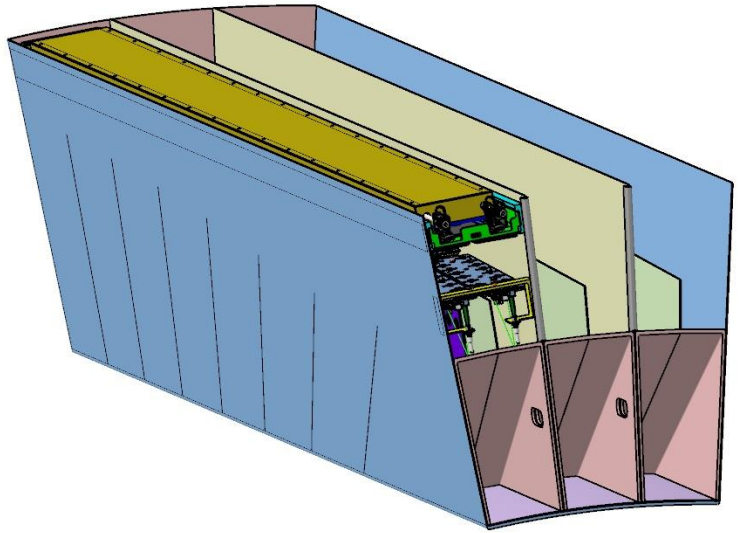


Movable electronics box

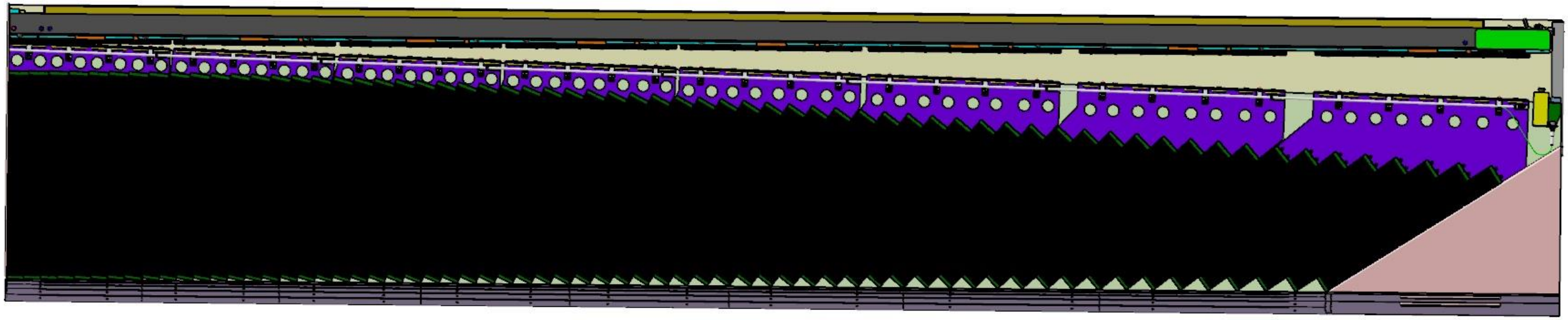


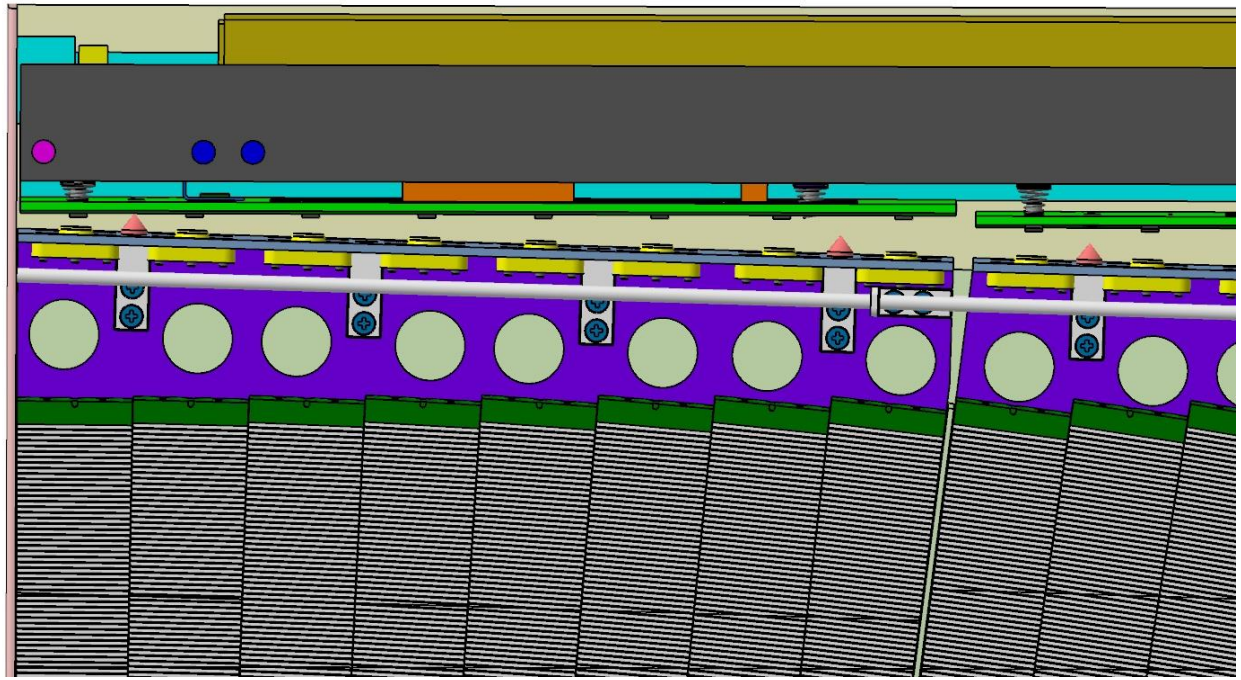


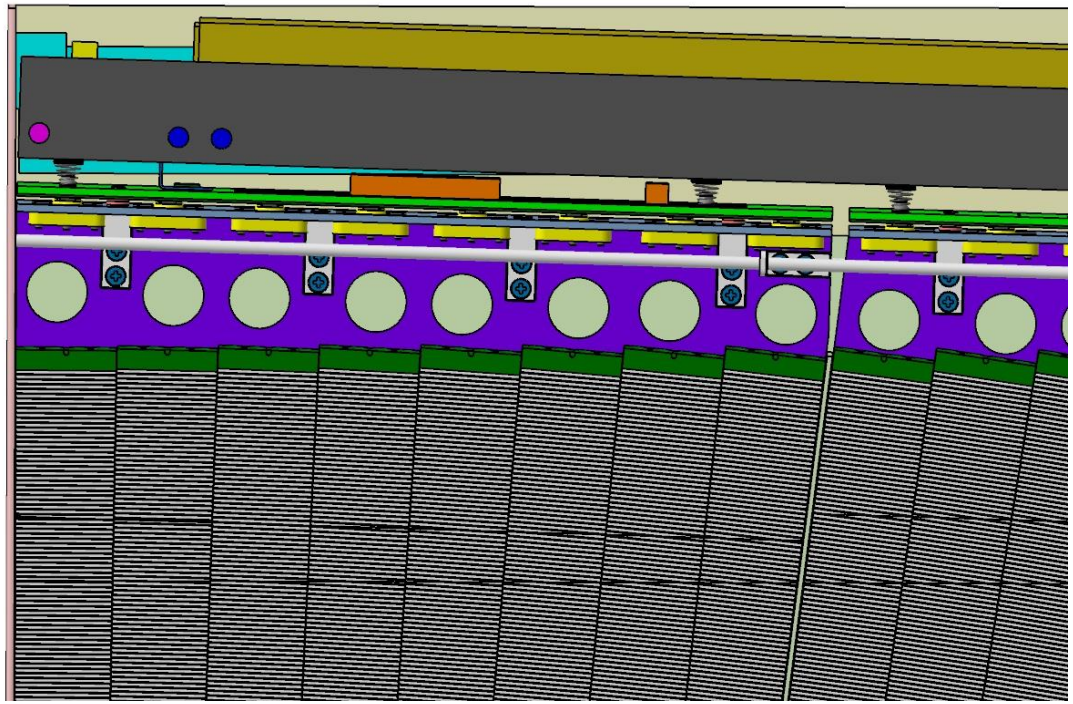




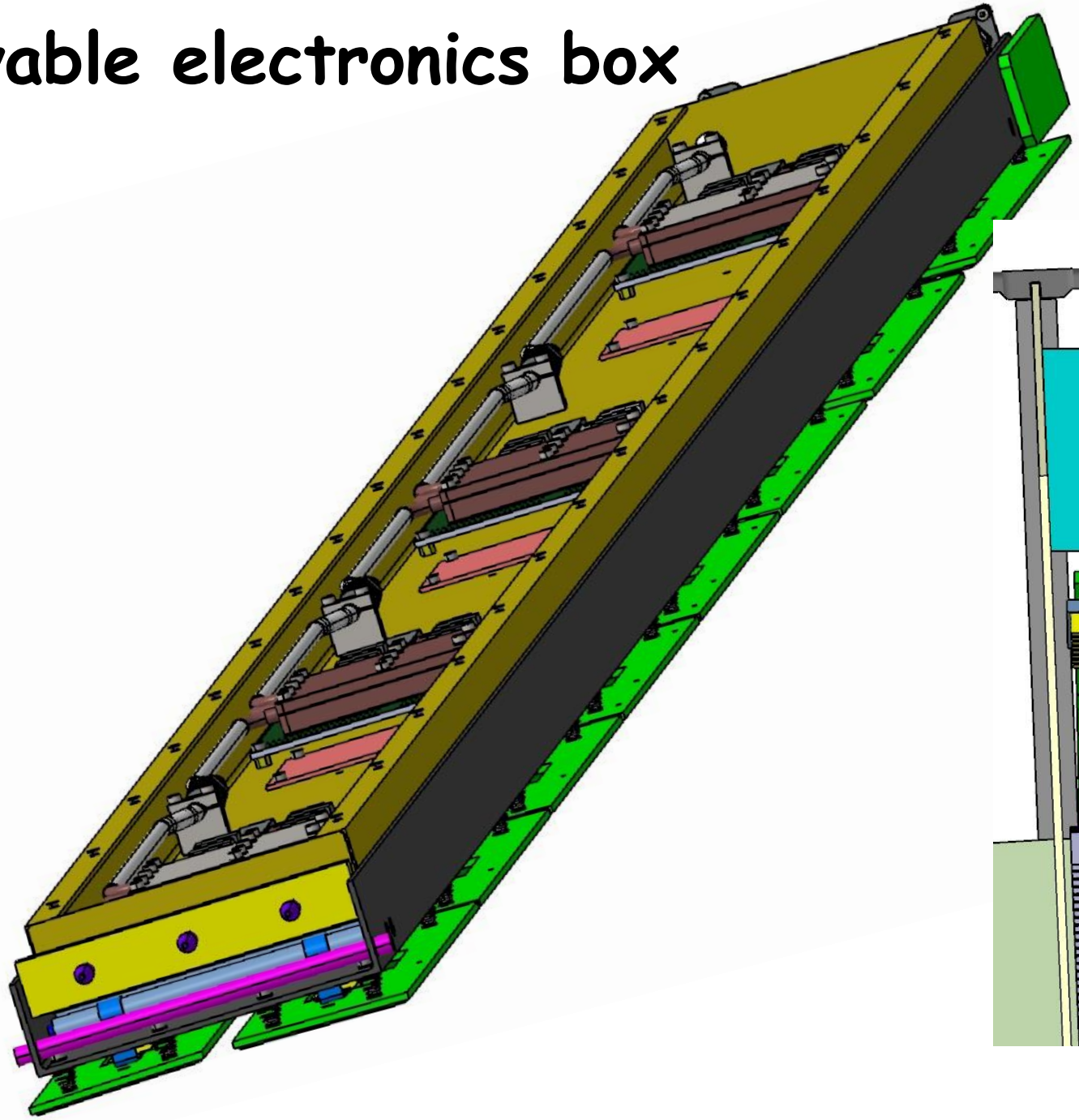
Movable electronics box

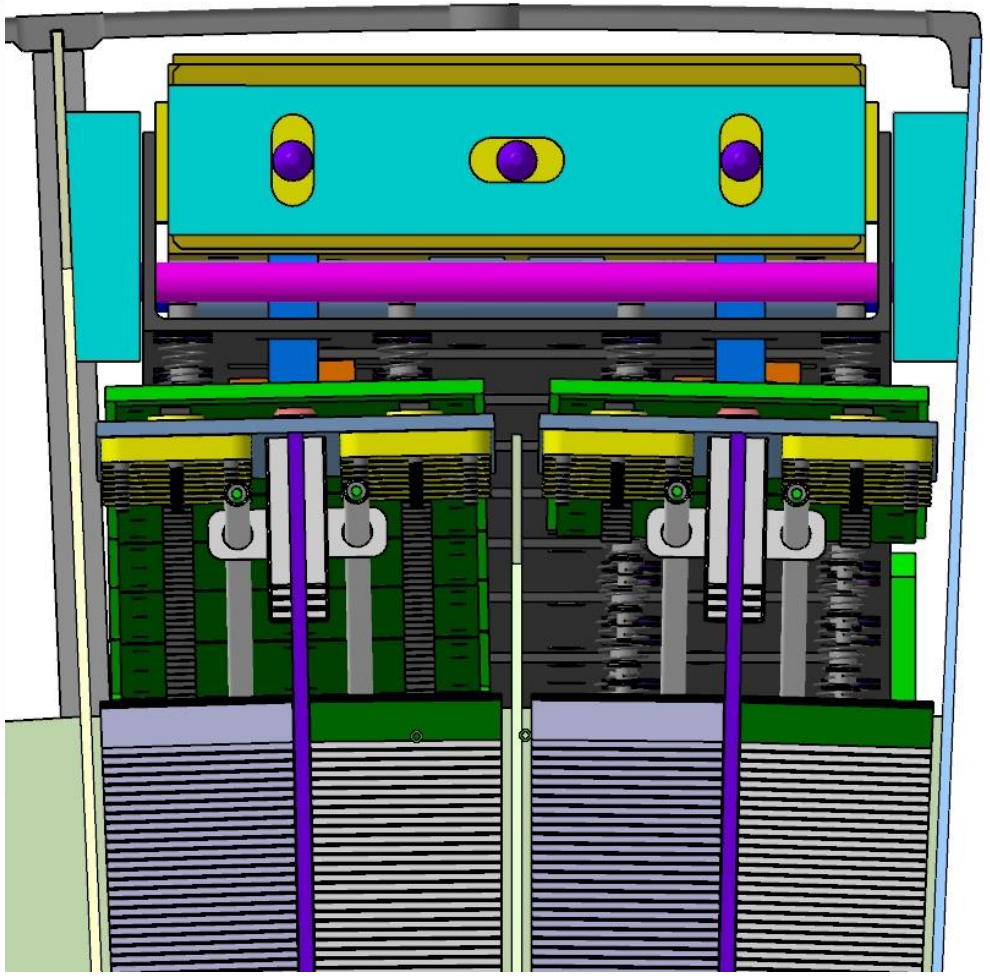




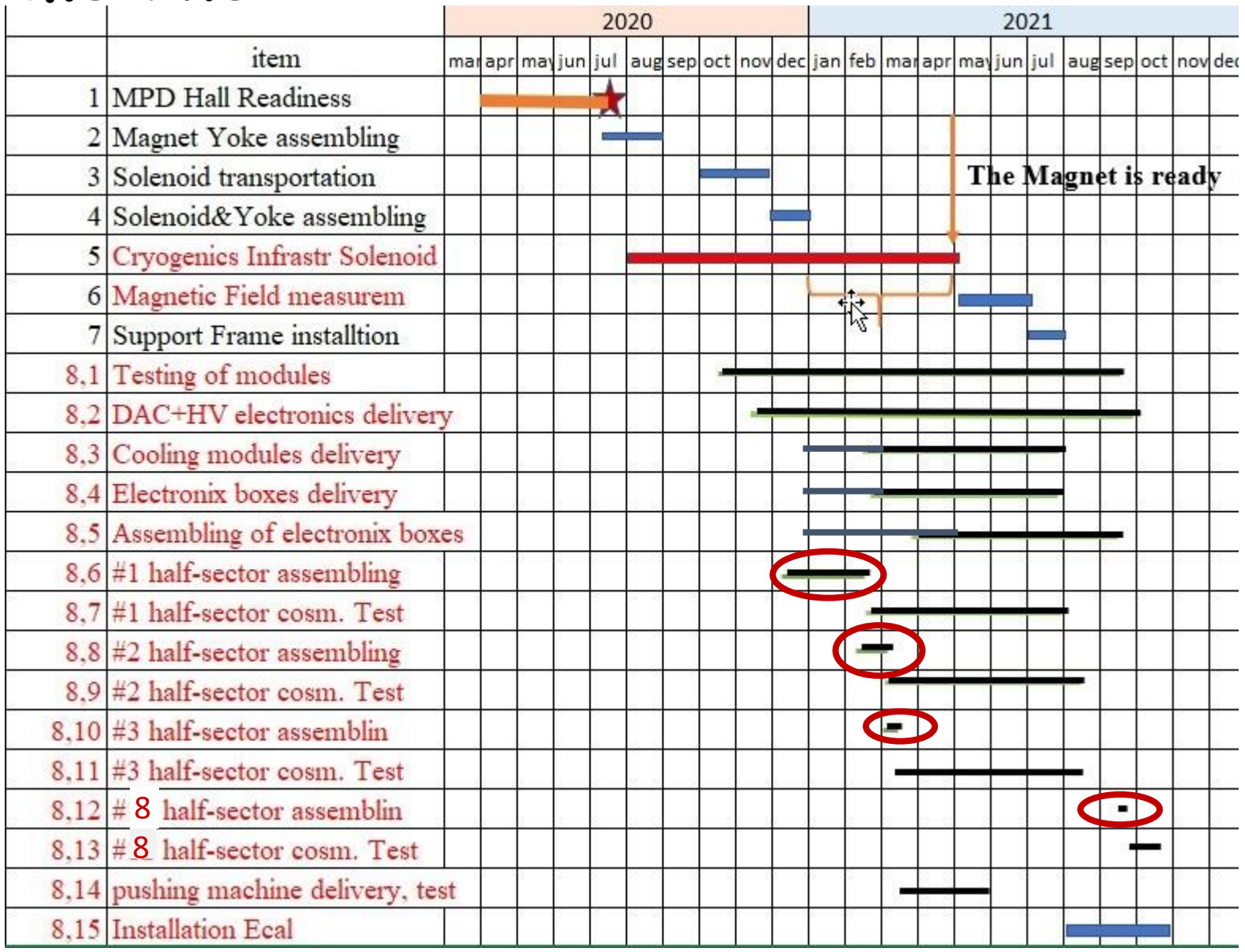


Movable electronics box





Assembly Time line

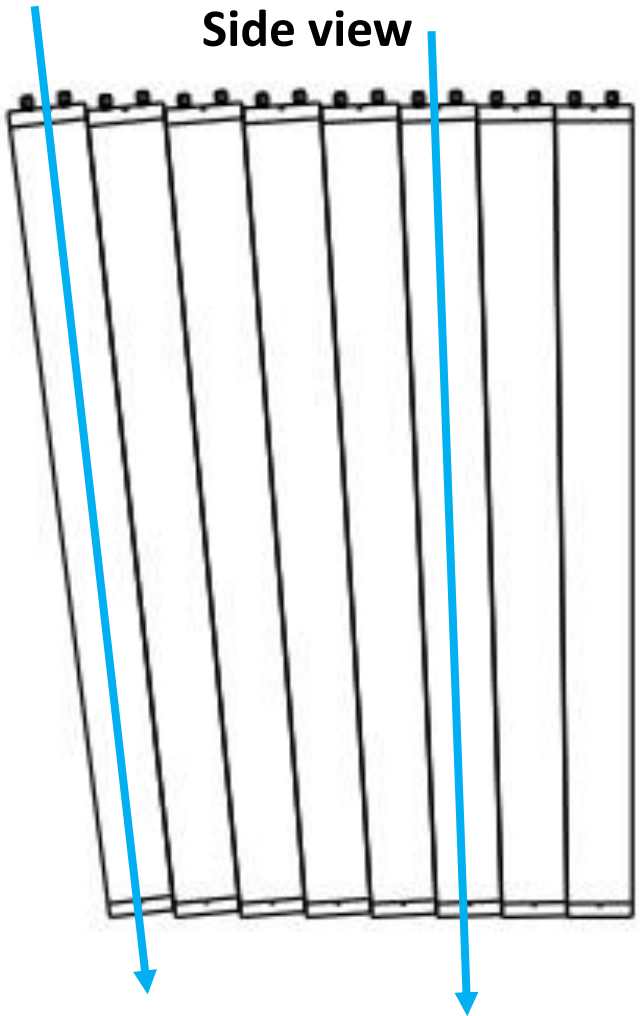


Calibration

Cosmic muons may be used to equalize signals from all channels

Longitudinal muons

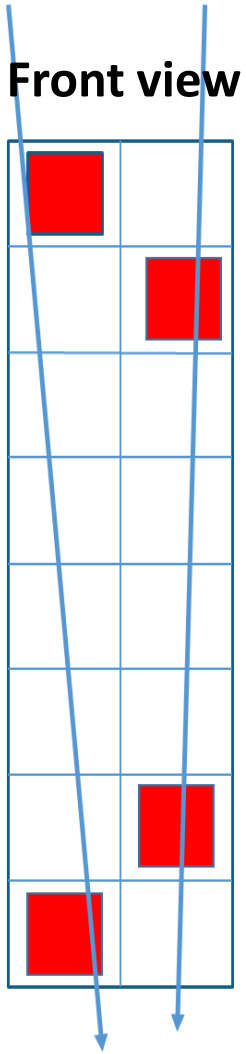
Side view



Or

Transverse muons

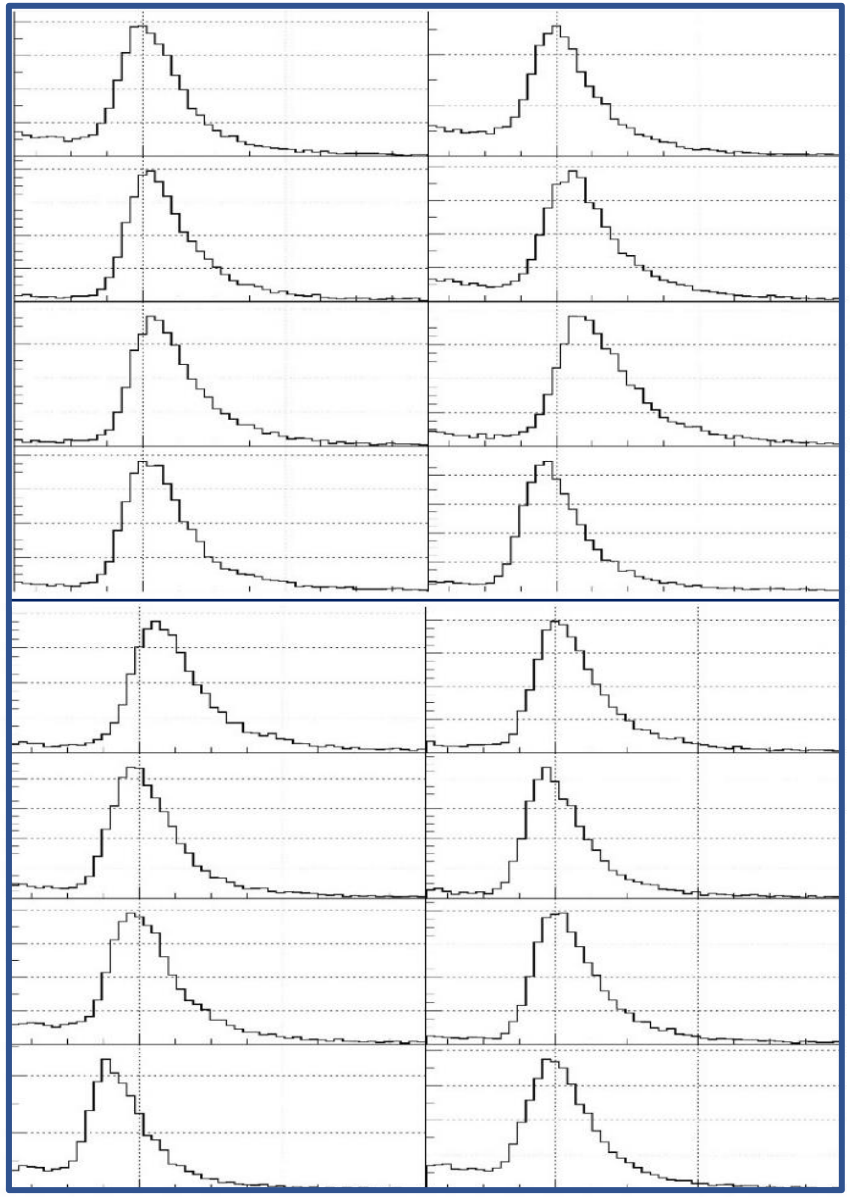
Front view



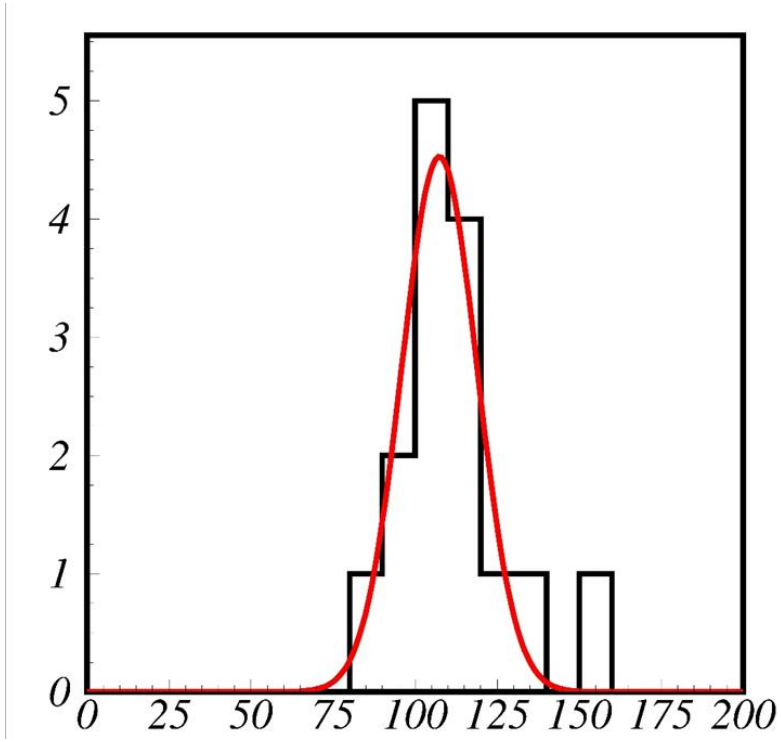
Self trigger mode of ADC64 used to register “longitudinal” or “transverse” muons

1. Direct but low efficient method
   About 1 week to collect enough events in each channel
2. Not direct - Require some assumptions
   High statistics – 10 hors is enough

Transverse muons



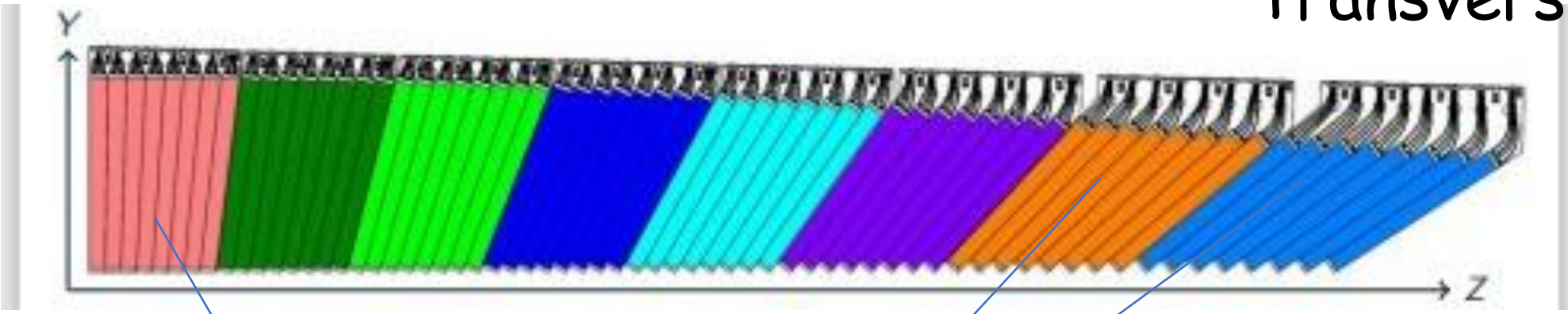
For selected muons distributions of signals for the 16 channels of one module

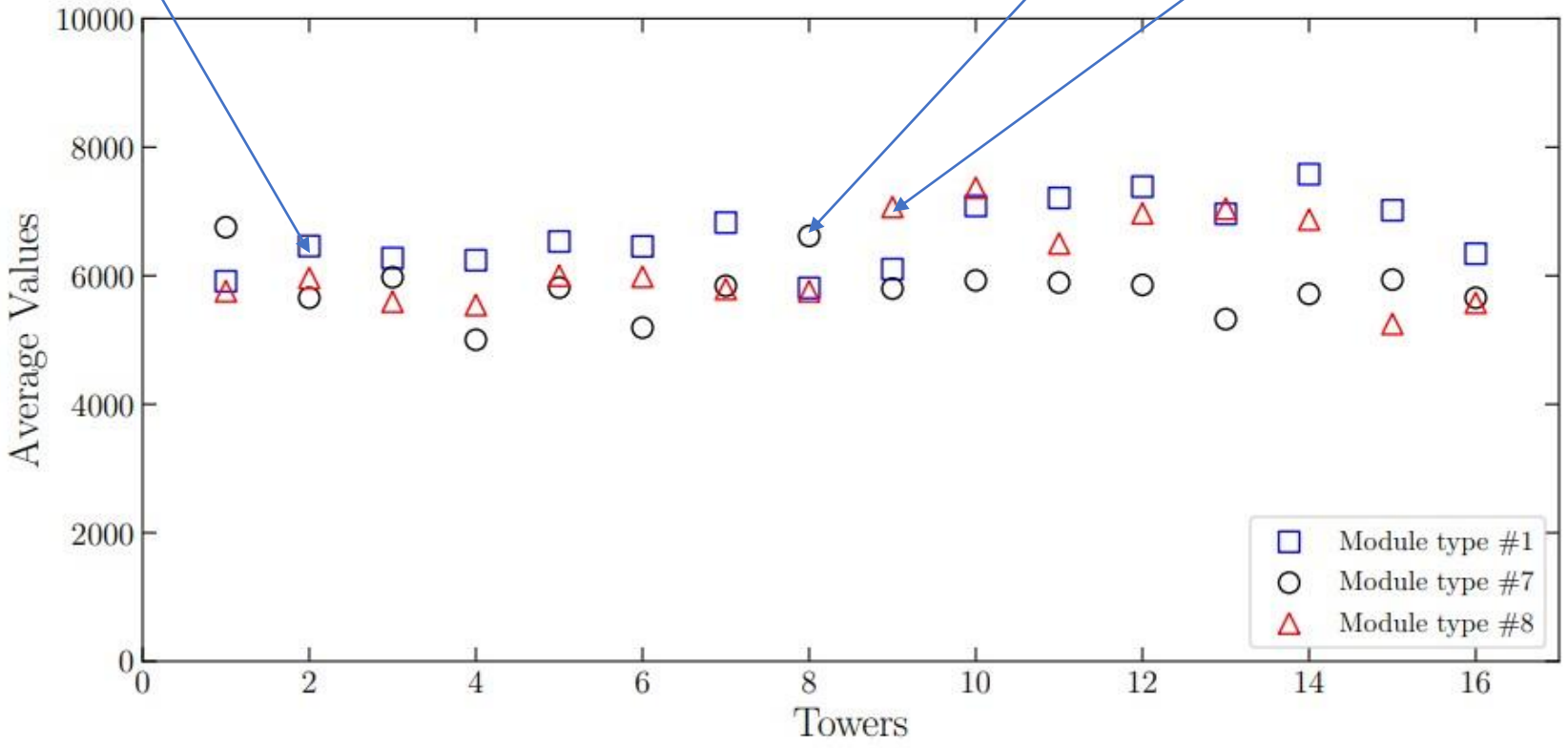


Correction factor distribution

Standard deviation from average is below 10%

Transverse muons

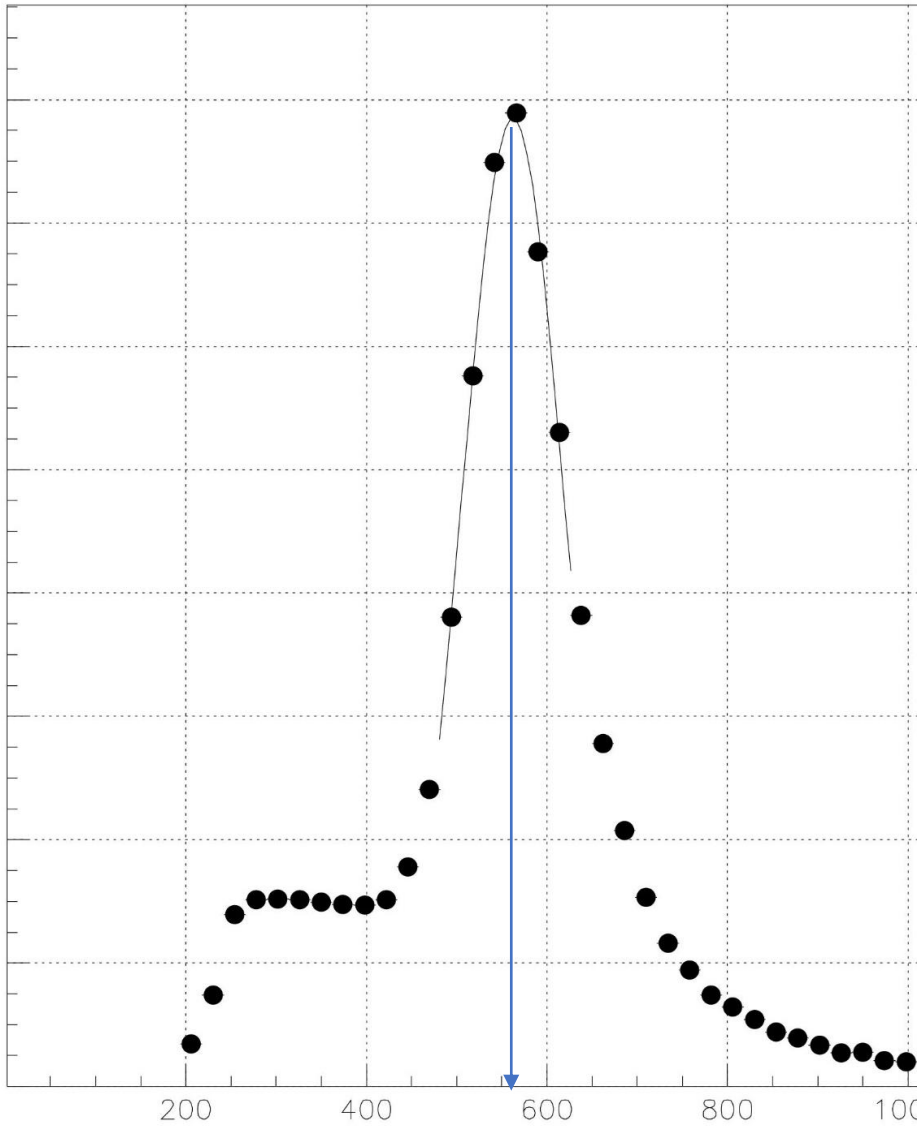


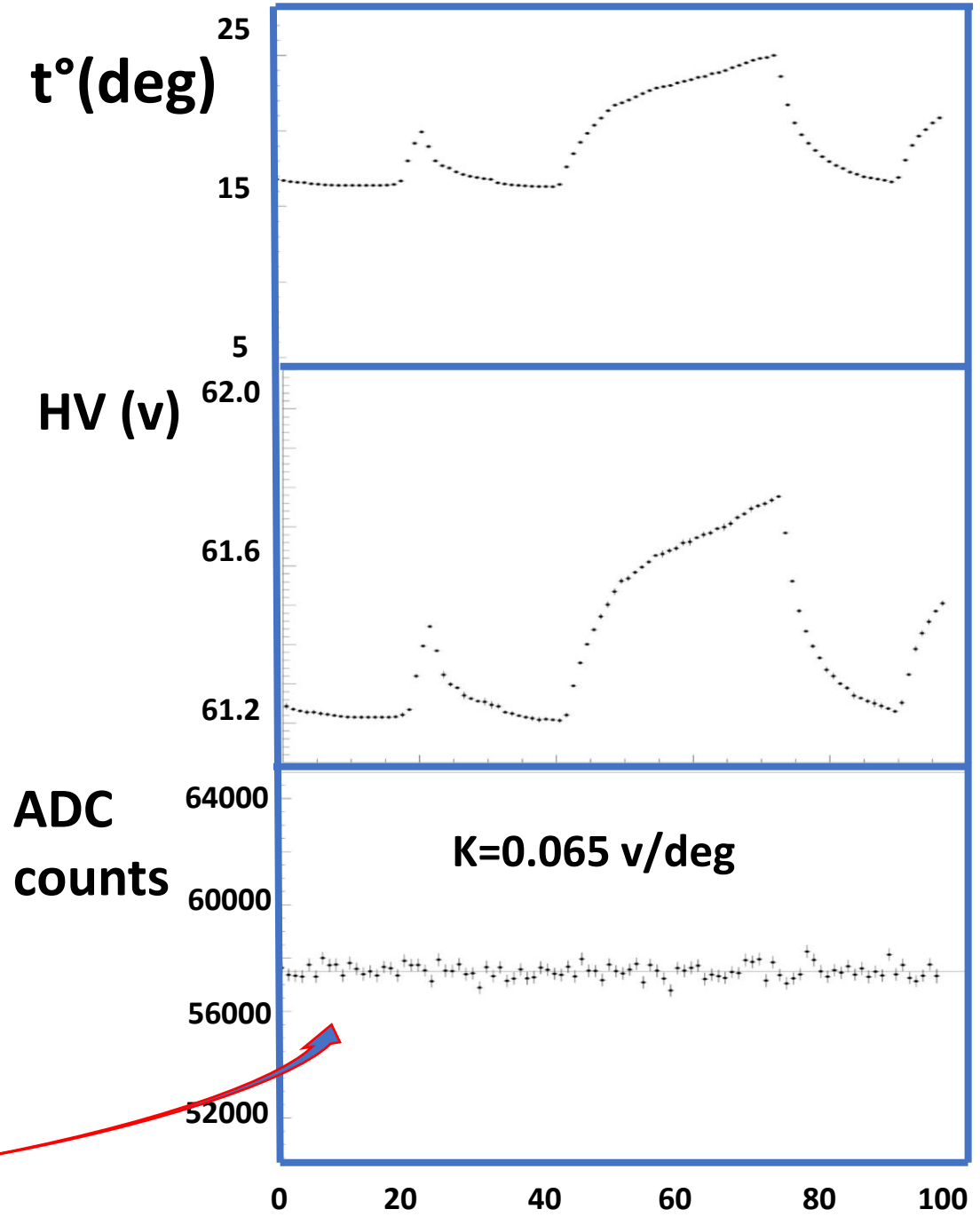


Comparison of the modules with different geometry

Results based on the pilot modules and will be repeated

Longitudinal muons

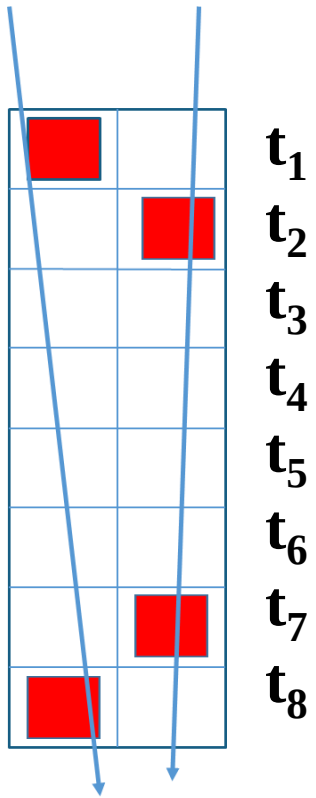


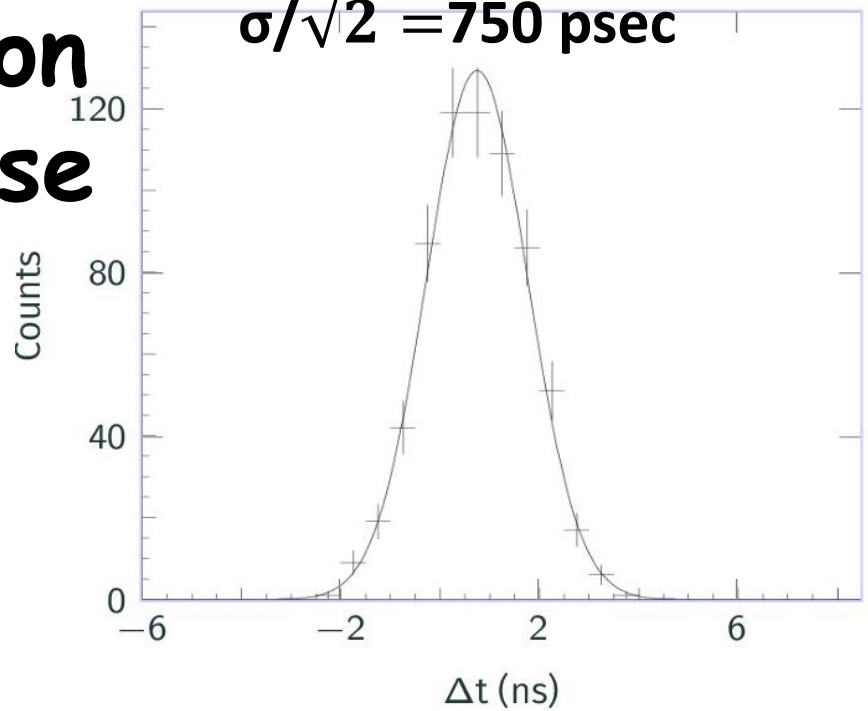


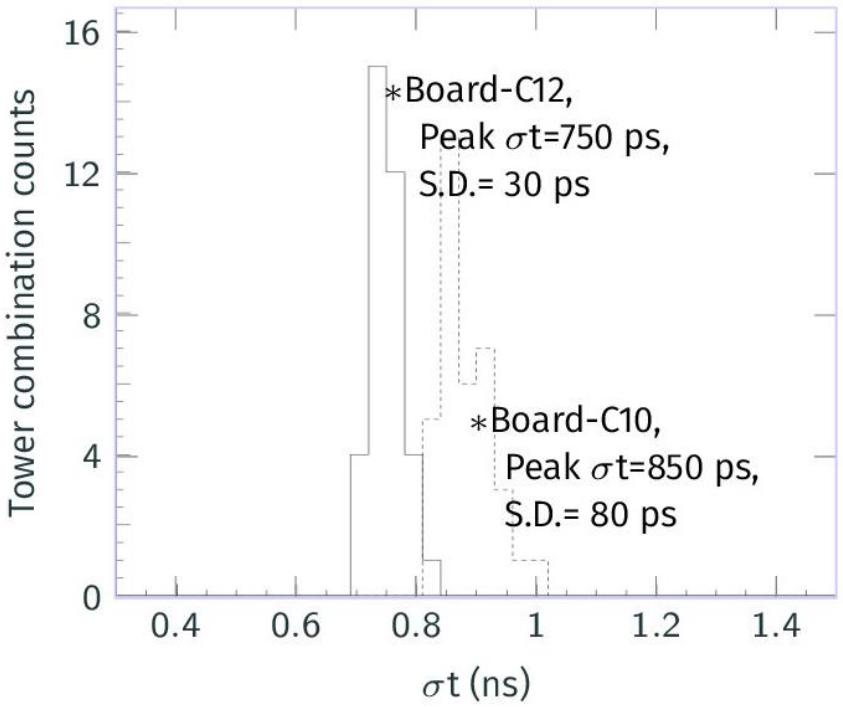
Time resolution with transverse muons

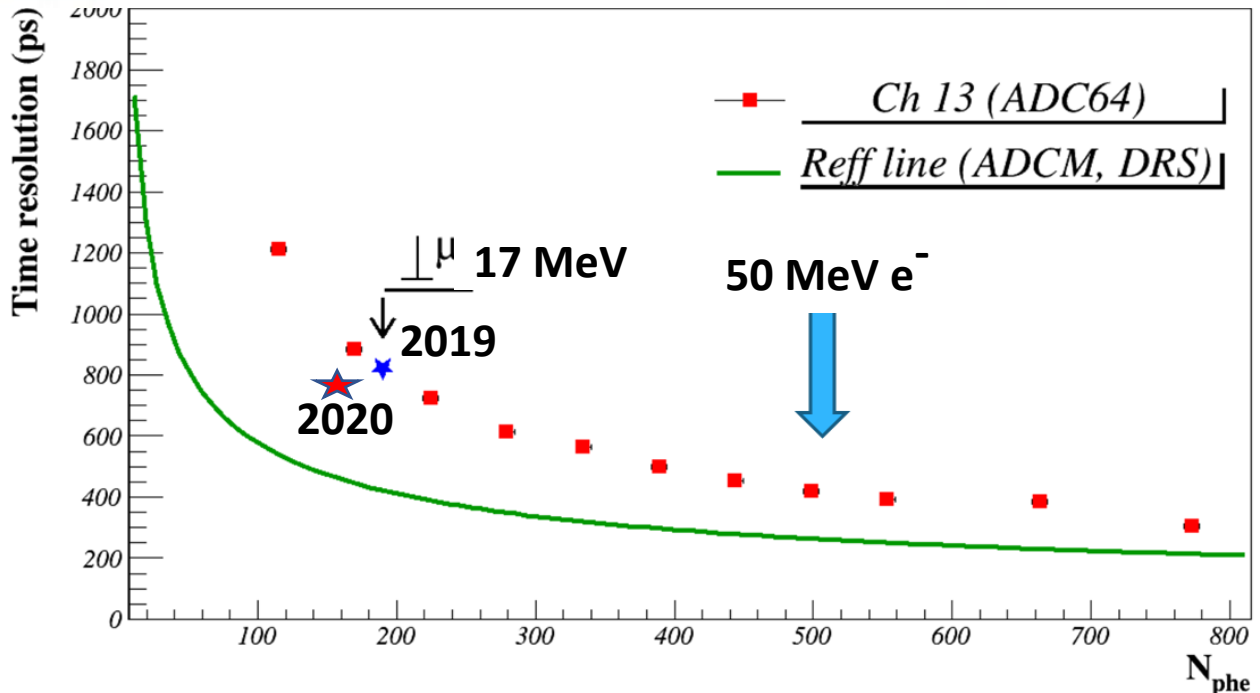
$\sigma/\sqrt{2}$ =750 psec

$\Delta t = t_i - t_j$



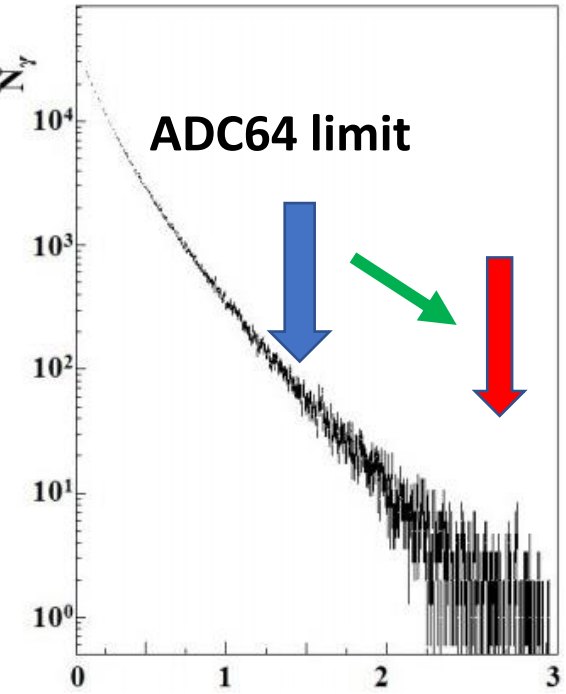


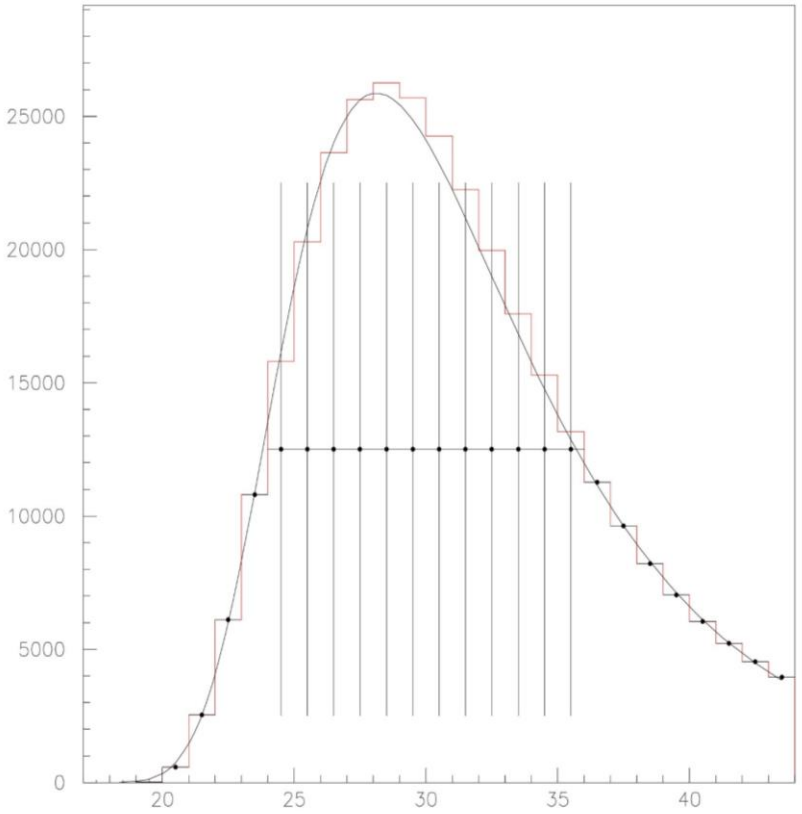


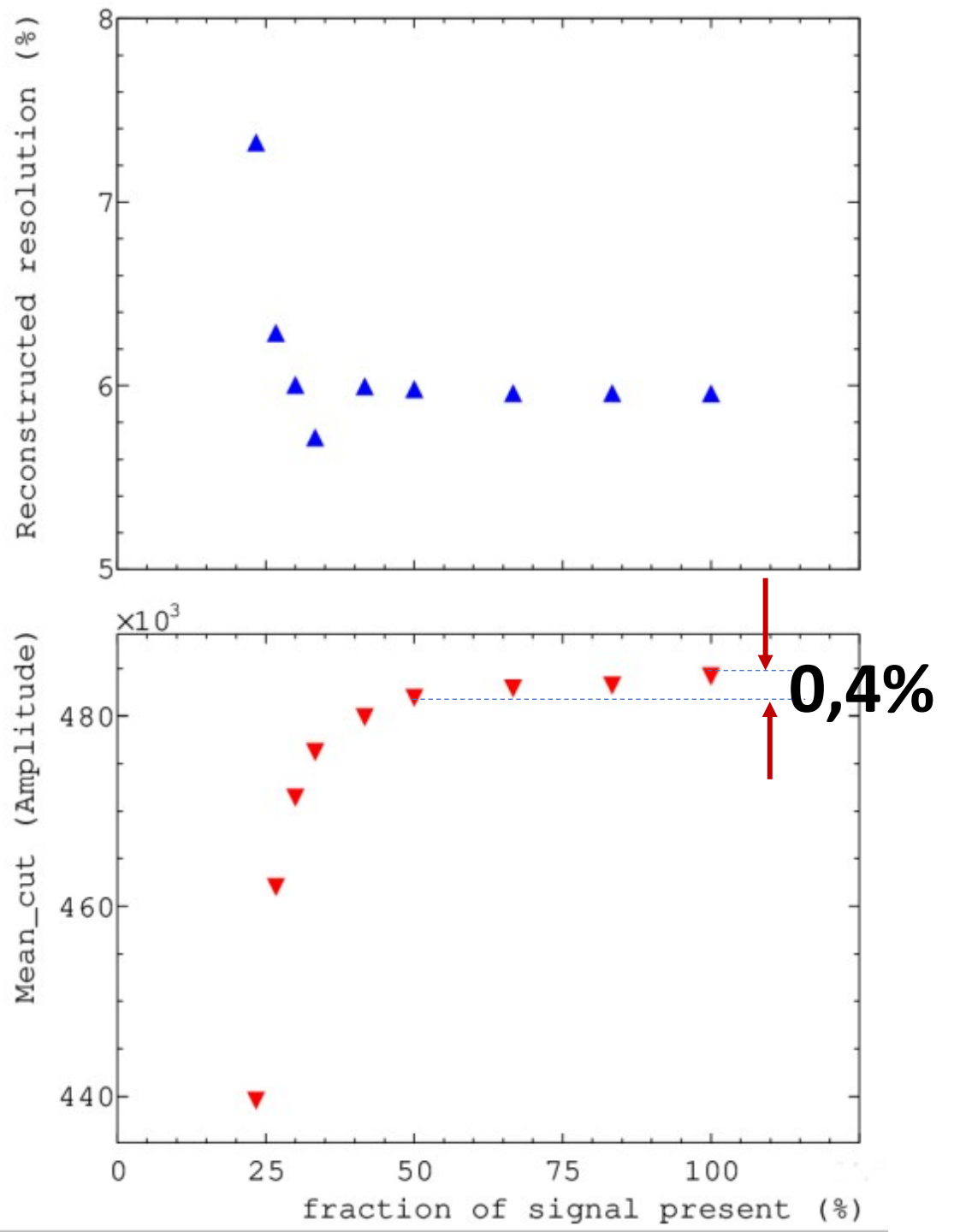


DAQ dynamic range

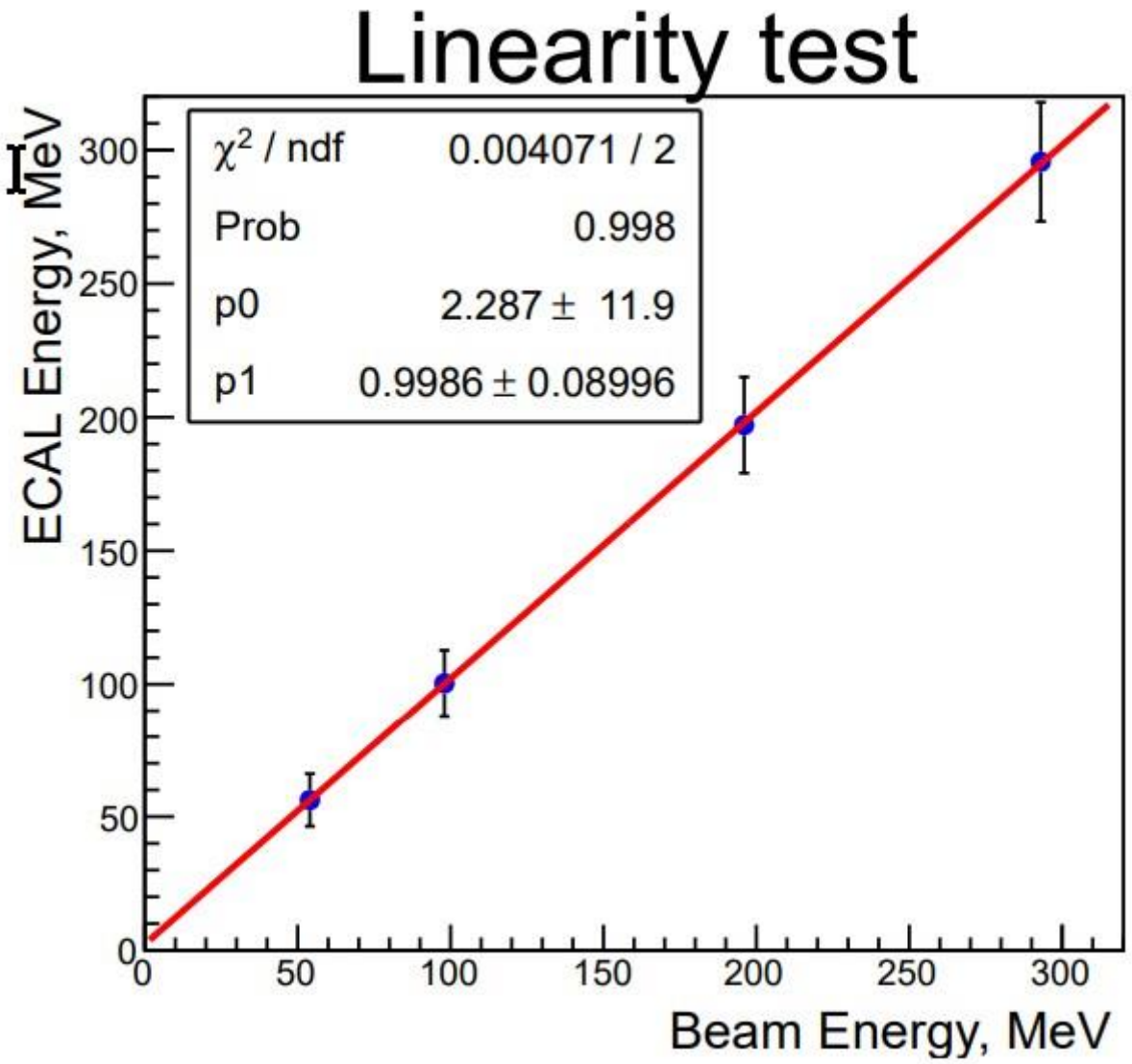
1,6 GeV Electrons form DESY

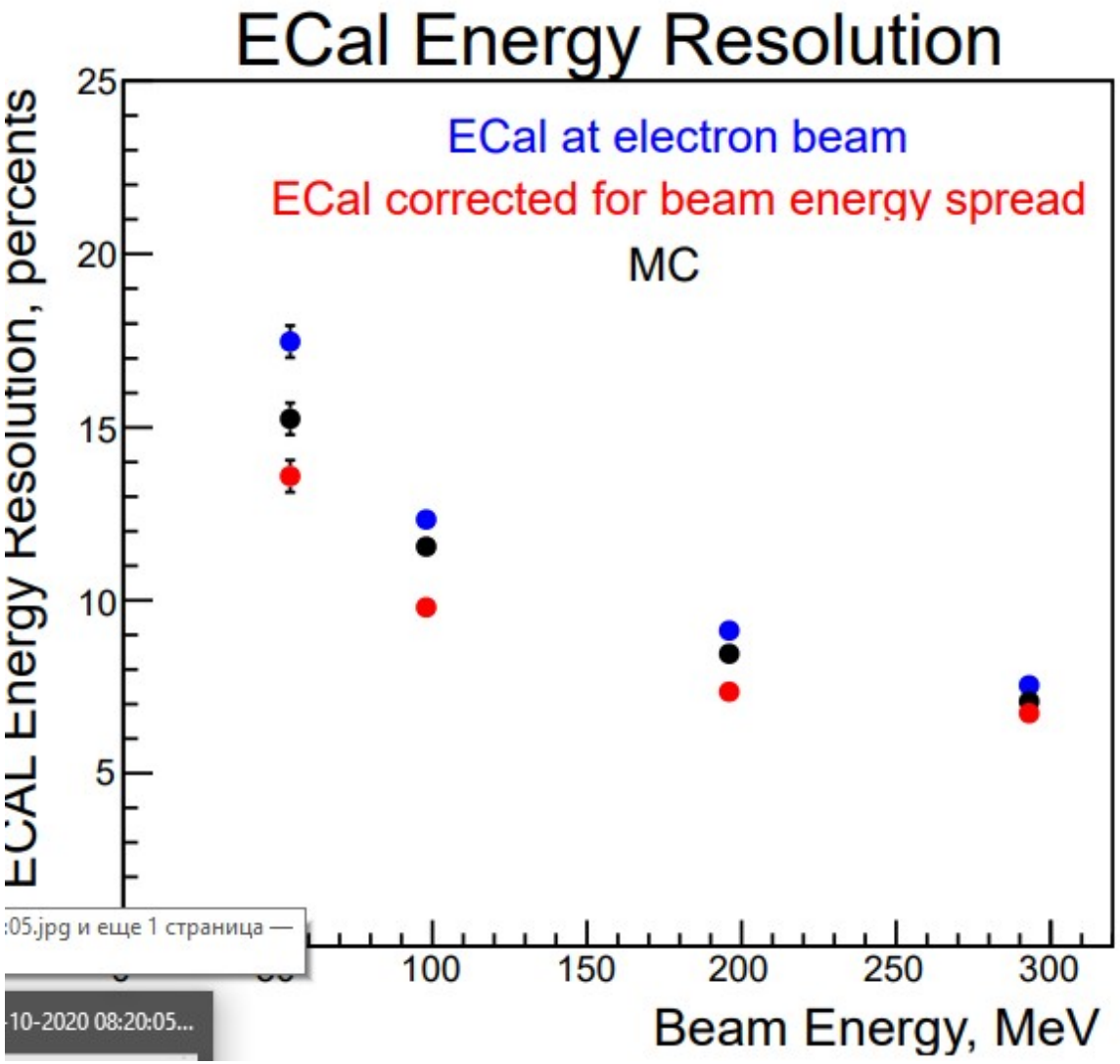






Beam test –Troick 2019





Processed by ITEP group

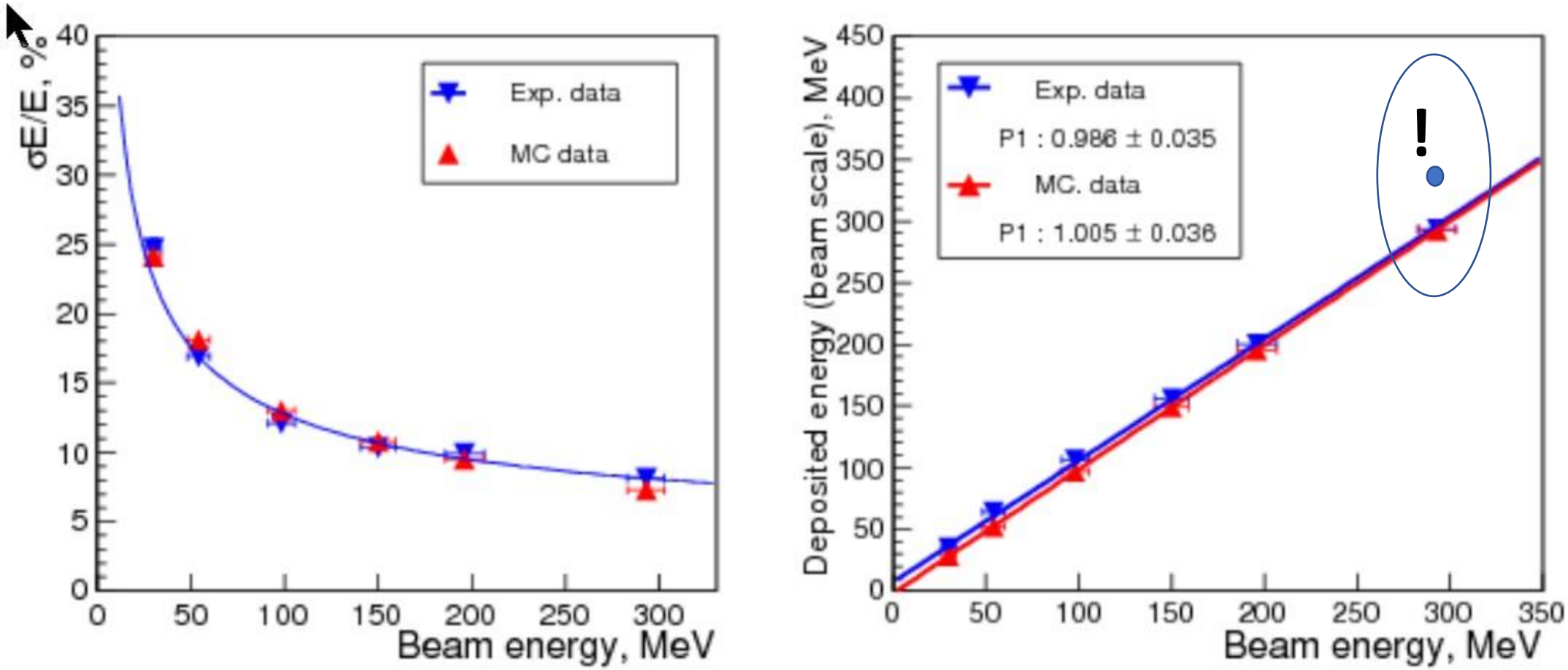
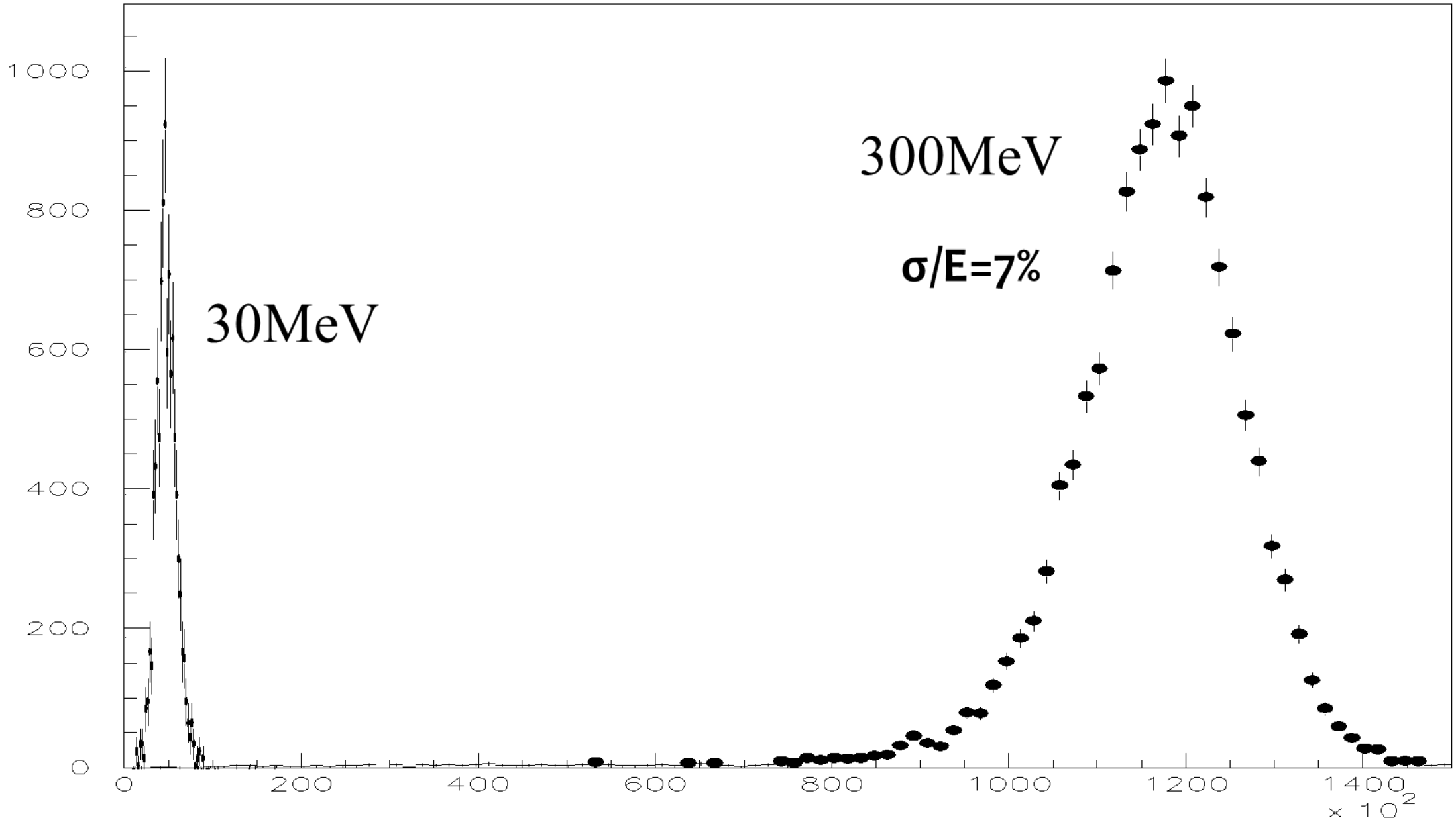


Fig. 7. Measured physical characteristic of the calorimeter assembly: energy resolution of experimental data and MC (left) and calorimeter linearity (right).

Beam test –Troick 2019



1. Production

- Modules production started in Russia. About 700 modules must be produced before autumn 2020.
- China is ready to start production in the few production areas.
- 16 sectors out of 25 may be ready to the first run
- Electronics boards are in production
- Cooling system is designed, built and tested. Production of cold insertions is started
- Carbon made supporting frame is in the production
- Sectors assembling procedure is under development
- Design of movable electronic system is not yet finished. Test of elements are going on
- Assembling can start autumn 2020.

2. Tests

- Tests of produced modules are going on by means of cosmic muons. Few test on the electron beam are expected when beam become available
- Procedure of modules mass tests and calibration is developed
- Time resolution for extremely low signals is studied and found in agreement with previous expectations
- Increase of dynamic range of electronics is proposed