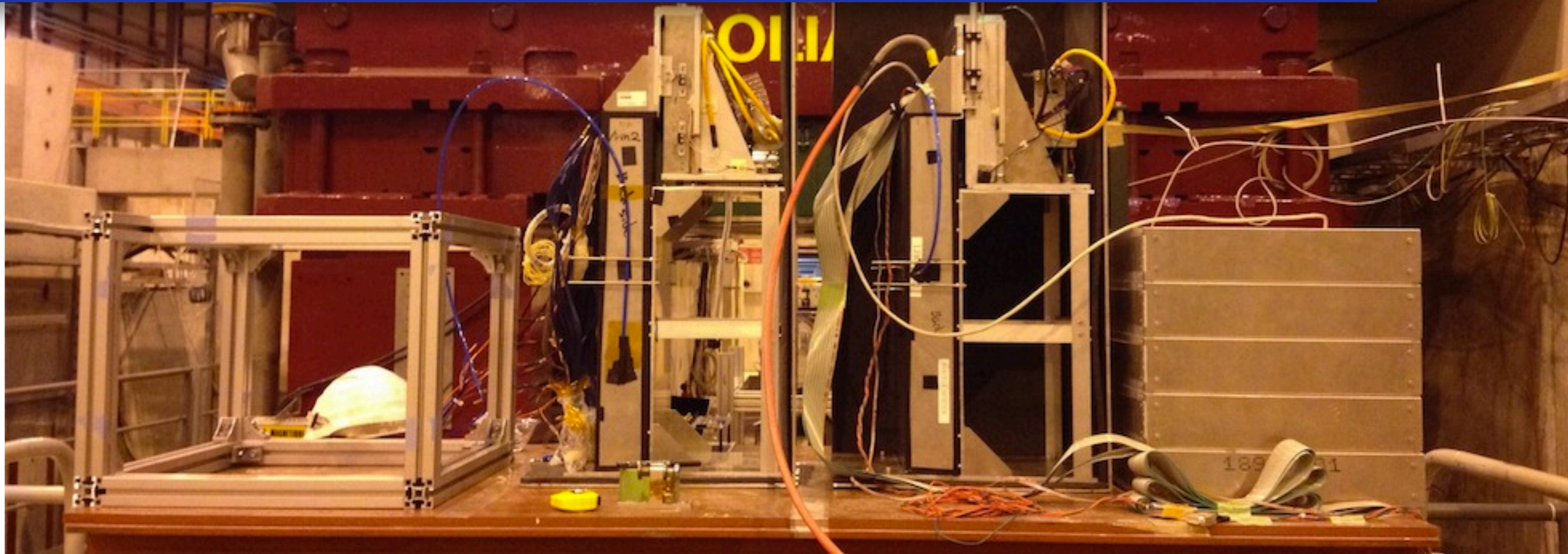


# LHCf beam test in 2022

allocated for Week 41 (7 days) (in v0.4)

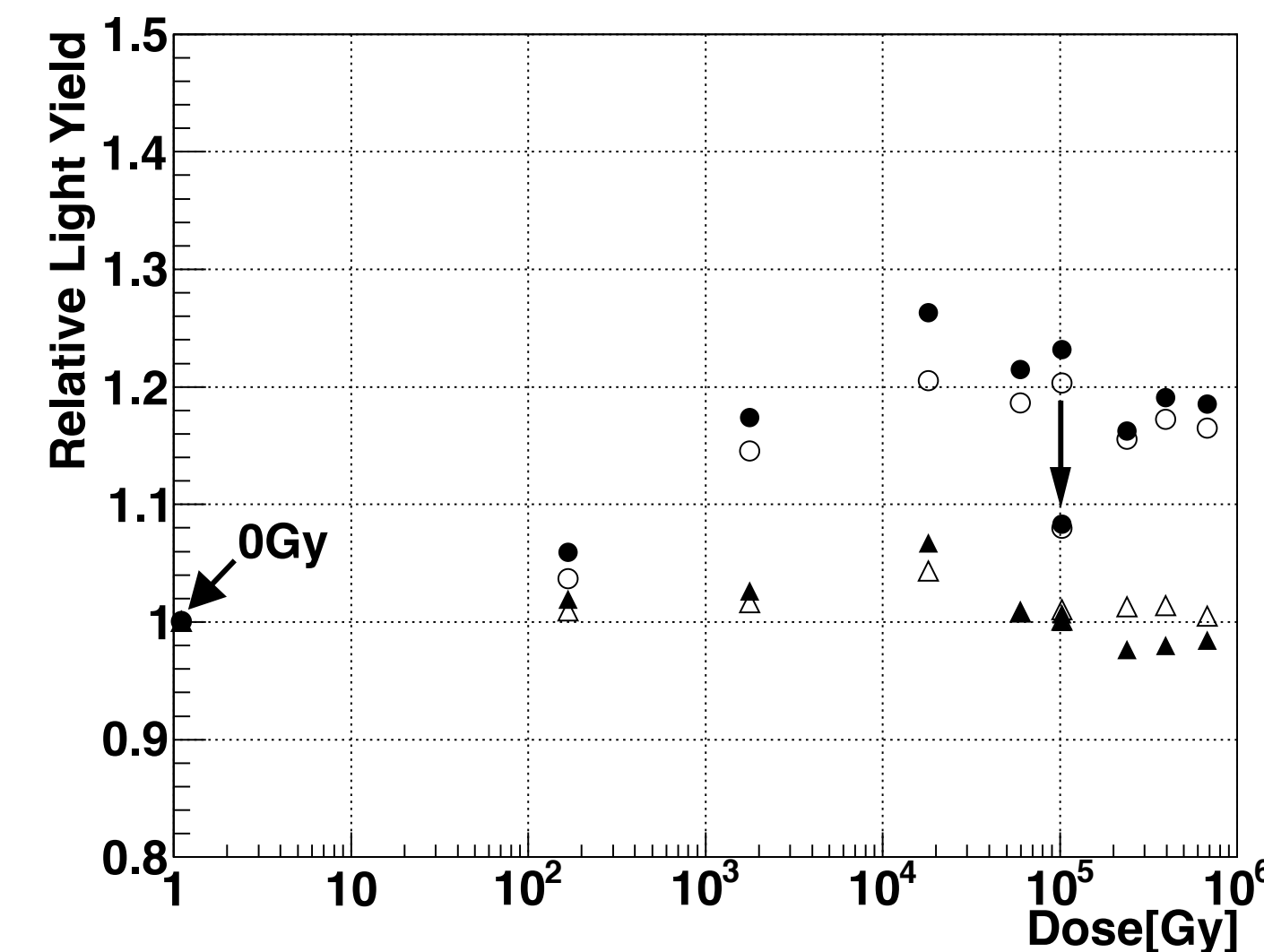
H. Menjo, Nagoya Univ.





# Motivations

- Precise calibration of LHCf detectors
  - Originally planned in 2021 beam test, but it was postponed due to COVID19
  - Precise energy scale calibration with  $< \sim 2\%$  precision under temperature control. (dominant systematic error on our measurements)
- Confirmation of radiation damage during LHC operation
  - LHCf run is scheduled for middle of September (right after TS1)
  - Radiation may “increase” the light yield of scintillators by  $\sim 10\%$
  - Slow recovery is expected. It is better to perform the beam test as soon as possible after the LHCf run.



# Beam requirements

- Particles and energies
  - protons: 150, 350 GeV
  - electrons: 100, 150, 200, (250)\* GeV
- \*) Highest energy with reasonable intensity
- Beam conditions
  - Parallel beams
  - Intensity of > 2000 per spill
  - beam spot size of ~1.5 cm radius
  - 2.5x2.5 cm<sup>2</sup> scintillator is used for triggers

## Preliminary operation plan

Setup (1 days)
<ul style="list-style-type: none"><li>• Installation (0.5 day)</li><li>• DAQ setup (0.5 day)</li></ul>
Operation with Arm2 (2.5 days)
<ul style="list-style-type: none"><li>• DAQ commissioning (0.5 day)</li><li>• Energy scan by electron beams (0.5 day)</li><li>• Position scan by electron beams (0.5 day)</li><li>• Position scan by proton beams (1 day)</li></ul>
Operation with Arm1 ( 2.5 days)
<ul style="list-style-type: none"><li>• DAQ commissioning (0.5 day)</li><li>• Energy scan by electron beams (0.5 day)</li><li>• Position scan by electron beams (0.5 day)</li><li>• Position scan by proton beams (1 day)</li></ul>
Contingency (additional tests) (1 days)
<ul style="list-style-type: none"><li>• Measurement of cable attenuation (0.5 day)</li></ul>
Deinstallation (0.5 day)

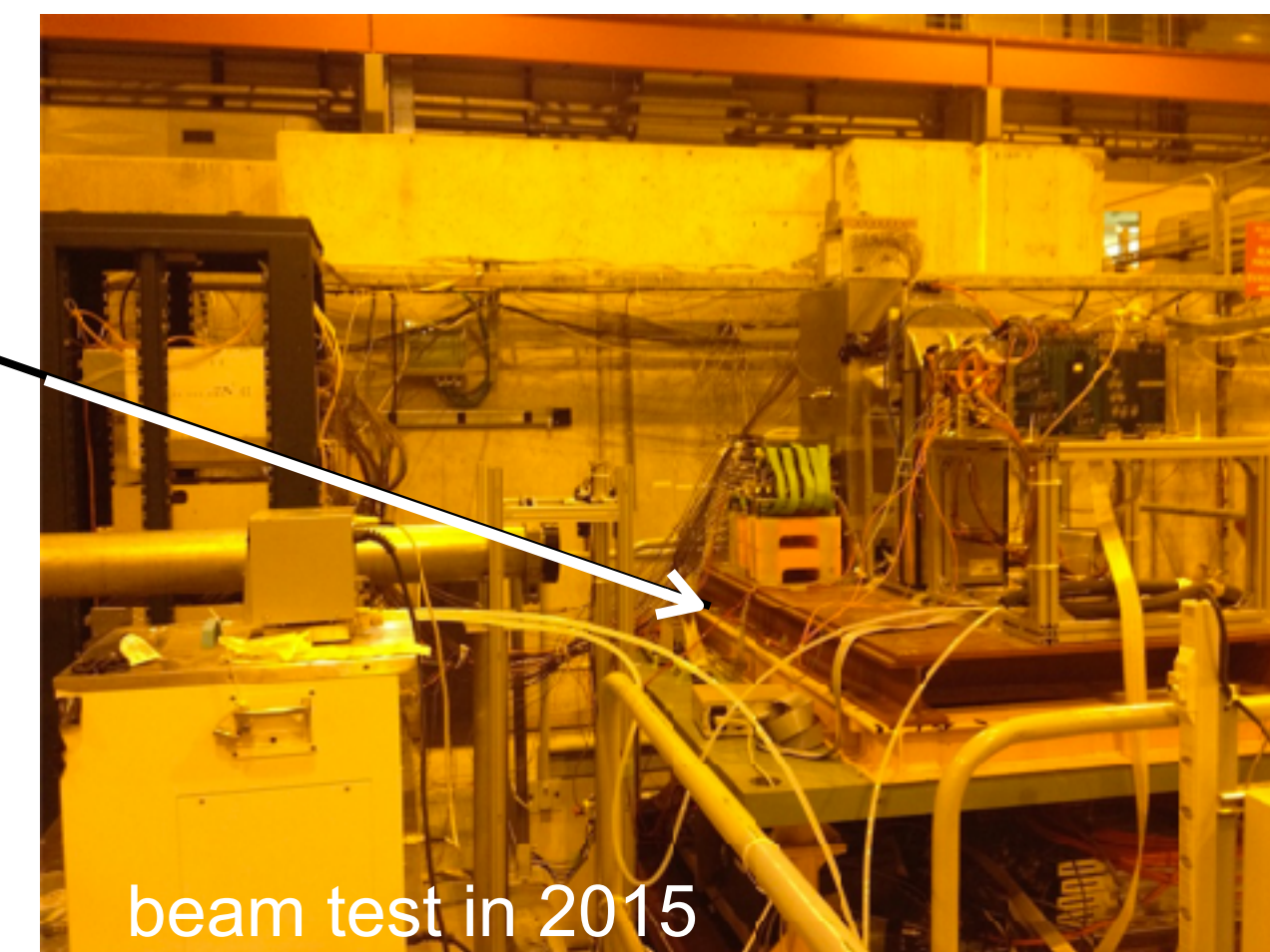
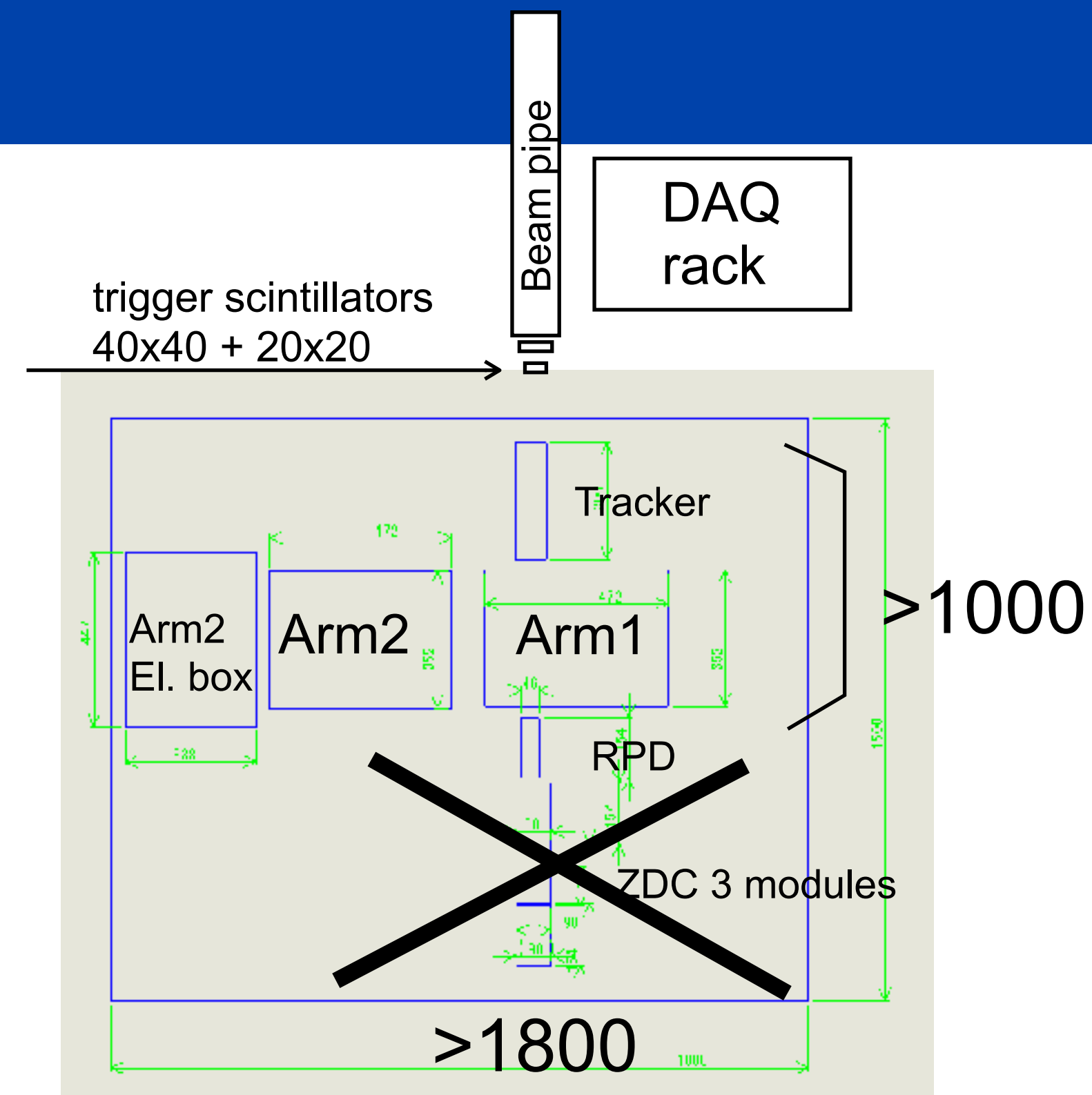
# frastructure requests

Beam line

- Big movable table
  - Required movable range H: 80 cm V: 20 cm
  - Table size: **>1.8 m x 1.0 m**
- One electronics rack
  - locate near the table
- Dry air (gas) for avoiding dew condensation
  - Only very small flow
- Crane works
  - for installation (1st-day) and de-installation (last-day)
- Geometrical Survey to align the detector to the beam line
- A chiller for temperature control (20°C)
  - Can we rent it from someone ?

- Operation room
- Space for pre-DAQ setup and test
  - ~ 5x5 m<sup>2</sup>
  - from 1-2 week before the beam time

This plate size: 2 x 1 m<sup>2</sup>  
Bigger plate is require  
for this year operation .



beam test in 2015



# Concerns

- First time to have a beam test in H2
  - Always we did in H4 and no experience of H2 in our collaborators.