Mexico laboratory
Weizmann Institute

Meir Shoa

Some History
OPAL DETECTOR

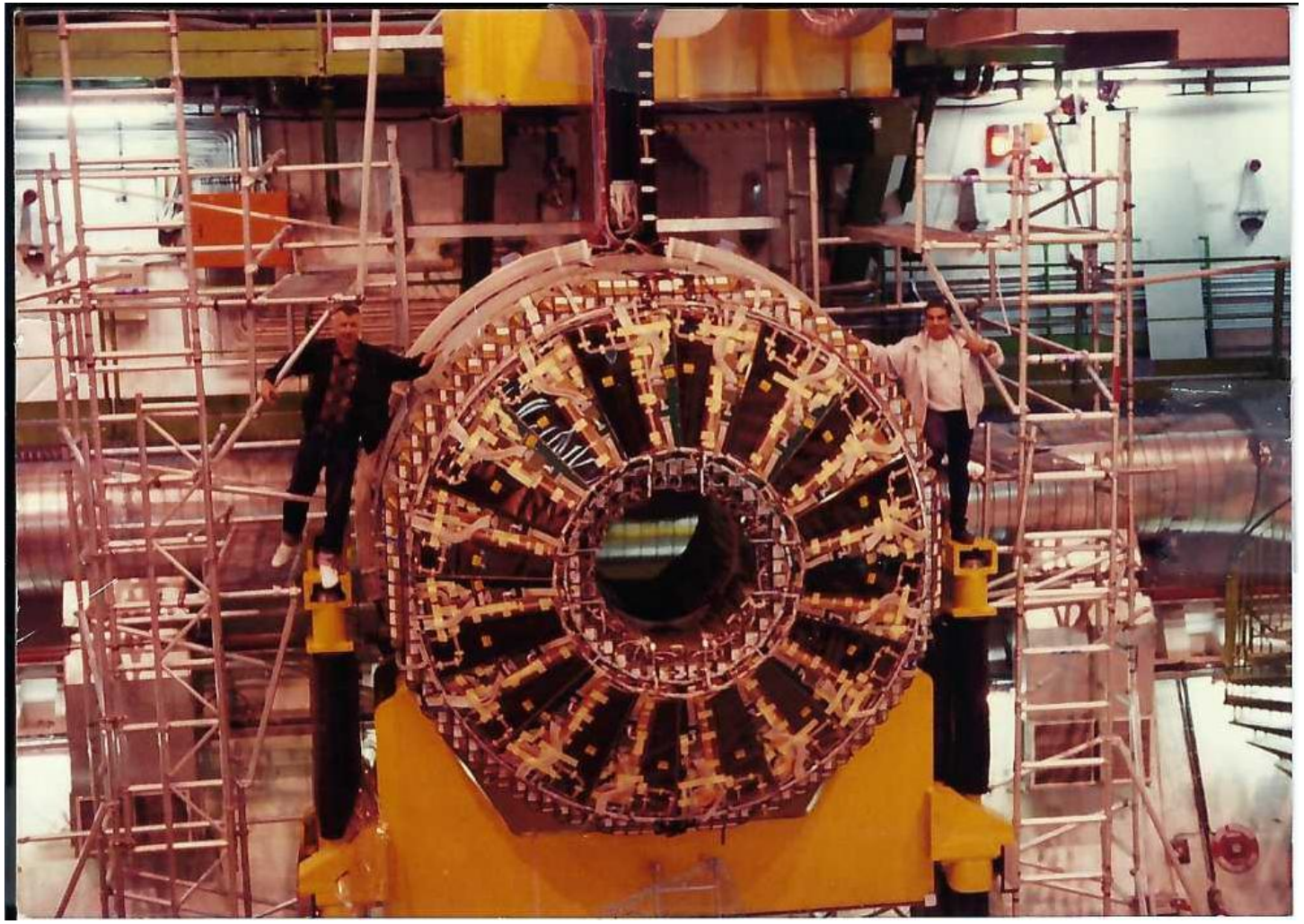
- OPAL (Omni-Purpose Apparatus at LEP) - one of four large detectors at the Large Electron-Positron collider (LEP)
  - Started operation with the collider in August 1989
  - Data taking ended - 2 November 2000
  - Detectors dismantled the following year to –
    make room for construction of the Large Hadron Collider (LHC).
- 1980-1990 - Lab activity - TGC for the Hadron calorimeter
  - R&D – TGC taken from prototype level to mass production
  - Production of 500 units
  - Installation

OPAL

Hadron Calorimeter

Presample chambers

Hadron calorimeter



1990-2000 Activities

- Maintenance of OPAL detectors

- R&D of special pre chambers and installation in OPAL
- Spaghetti project muon TGC chambers
  - Planned and constructed at Weizmann

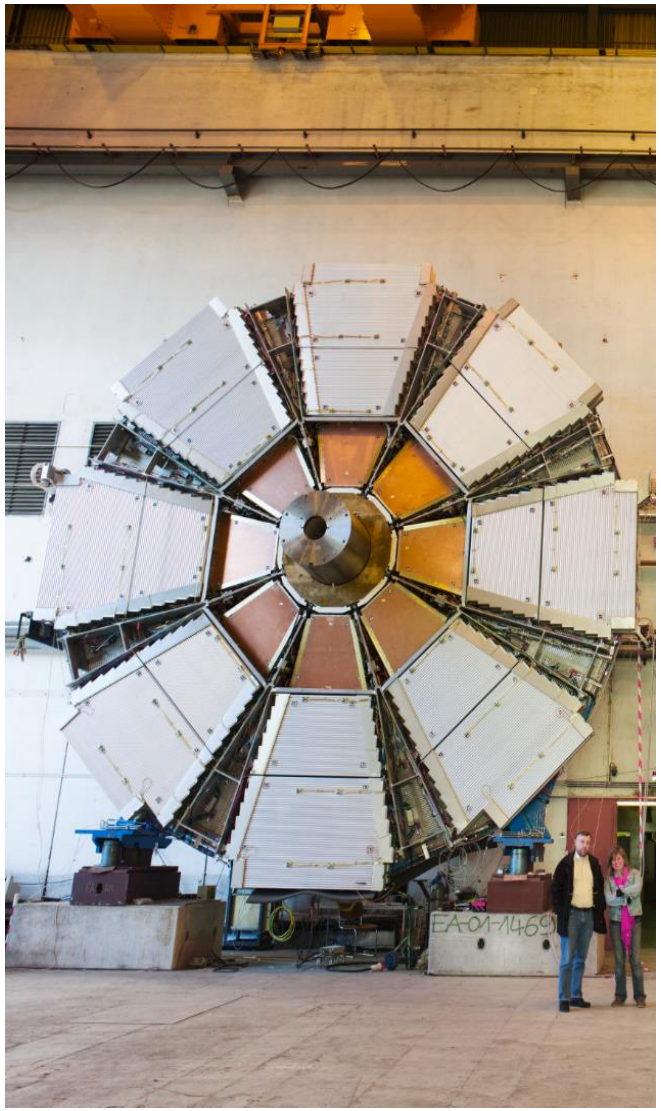
- Start of R&D of TGC's units for Atlas
- End of decade – start production of TGC's for the Atlas big wheels

2000-2008 Activities

- Construction of about 2100 TGC’s
- Transport to CERN
- Mounting of TGC’s on separated sectors
- Assembling of 6 big wheels and 2 small wheels
- Placing the wheels on Atlas pit (include services)

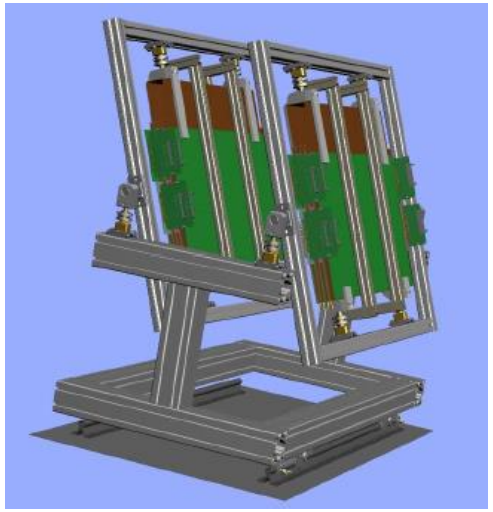
Big wheels

Small wheel



2008- 2014 Activities

- Maintenance of TGC's (big wheels)
- R&D and full design for New Small Wheels small-strip TGC (sTGC)

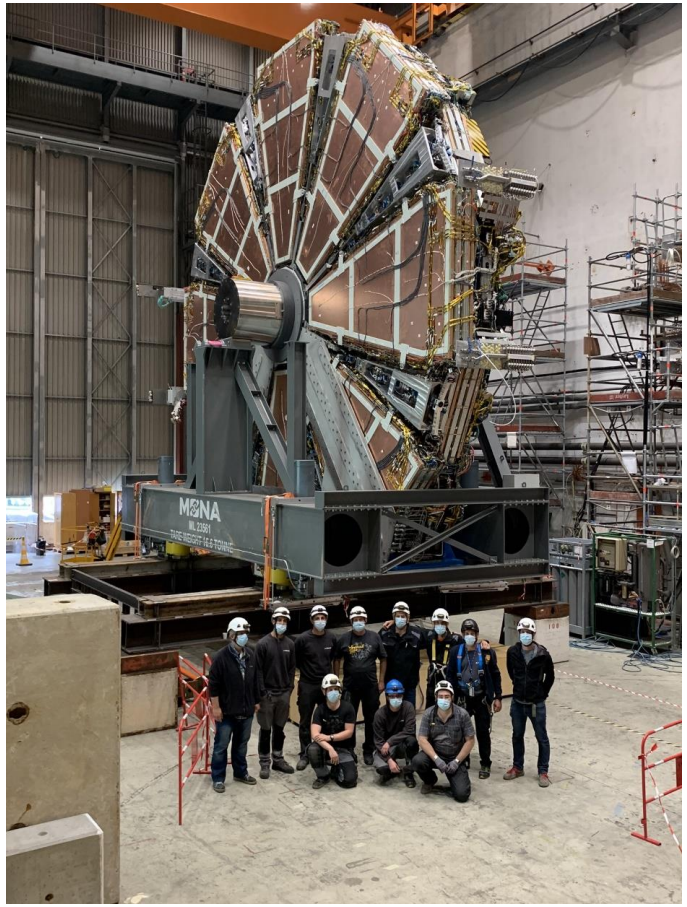


2014-2021 Activities

- Production of 64 sTGC’s quadruplets for the new small wheels
- Support involved sites for production
- Transport to CERN
- Testing detectors at CERN including Beam test and GIF
- Expert team for electronics and units assembly at CERN

New small wheels

2 NSW are operating underground in the ATLAS pit



Current activities

Mexico lab

- Maintenance for the big wheels in ATLAS
  - DCS, Spare production and replacement

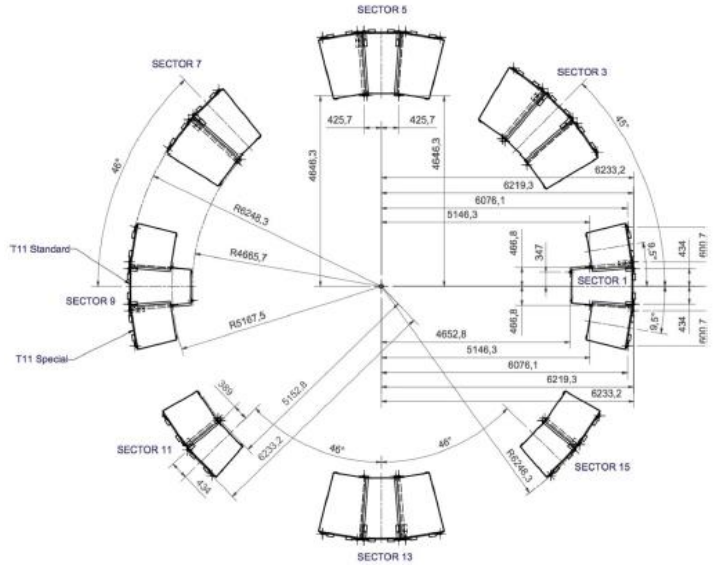
- R&D projects
  - Muon spectrometer NA60+
  - EIL4 TGC - to replace on 2026

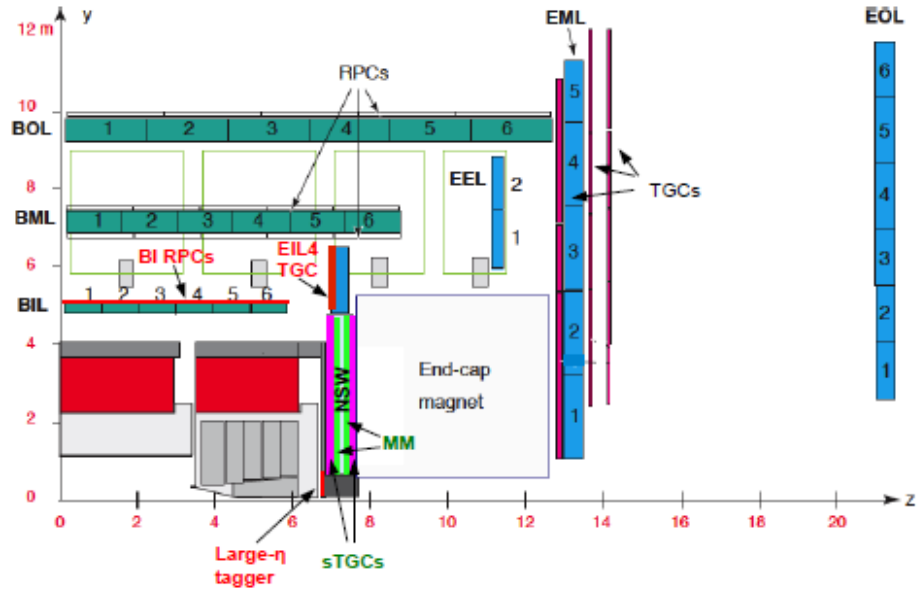
- Production of the new EIL4 will start soon
- Design and planning the new lab

Spare TGC’s units

- 22-23 – 7 units will be replaced next EYETS
  - Production is taking place these days
- LS3 – 23 units are needed to be replaced
  - Production (ongoing) and spares.

TGC-EIL4 Project





42 triplets will be produced and installed at ATLAS during LS3

Laboratory team

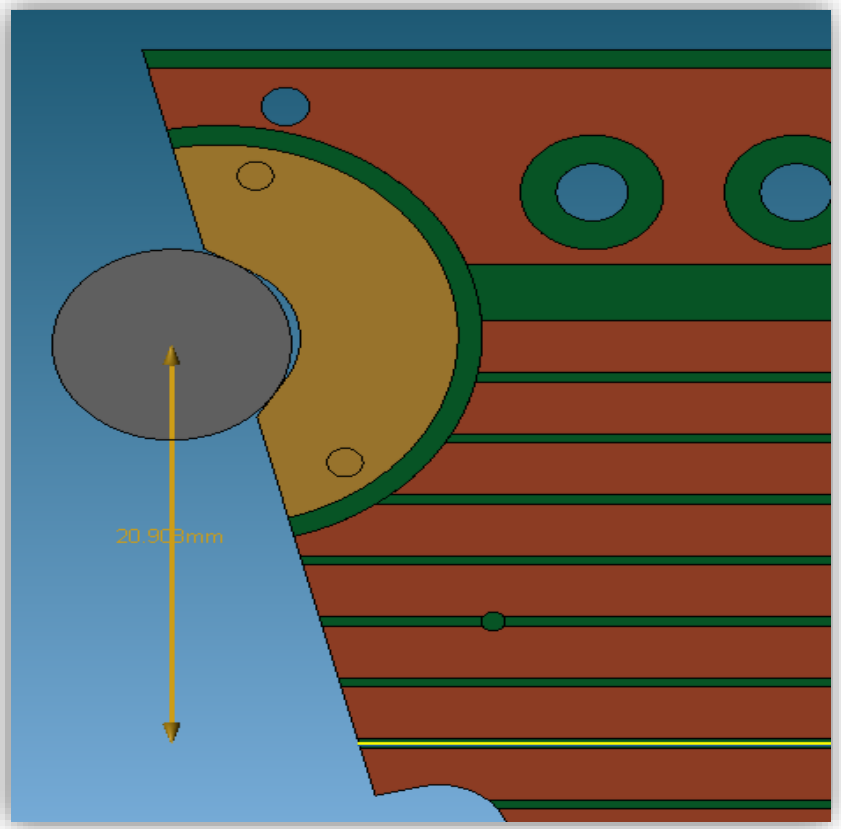
- Part of the physics core facility unit at WIS
- Scientific Personnel
  - Overall scientific leadership – SB
  - Two permanent physicists – IR, LM
  - Physicist consultant – VS
  - Per project leadership – SB, SM, NT
- Technical team – 5 full time employees
  - Management - MS
  - Two project leaders – GC, FB
  - Two engineers – BY, ZF
- Temporary team – hired per project
  - Currently 2 and up to 20 in intense mass production periods

Laboratory expertise

- Multi wire proportional chambers
- Transition for MPGD structure is straight forward
- Transition to other technologies is doable

- Fully equipped with necessary instrumentations
  - Flat granite tables, PS, measurement equipment and raw material to produce detectors
- Procurement of new instrumentation supported by the institute
  - Provided decent scientific justification

Example equipment – Faro arm



3D measurement to the 20 um level

Example equipment – Graphite spraying machine

- Capacity > 40 large area PCBs (TGC CB are 3 m^2) per day
- Good accuracy

Example equipment – Adjustable winding machine

- Custom made based on in house design
- Adjustable table size – to cope with the different dimensions of the TGC types

Example equipment – XY X-ray mahcine

- Designed for the QA/QC of the sTGC
  - By the Russian team
- X-Y portable table synchronized with X-Ray tube and PS

- Used for gain uniformity test and identification of hotspots

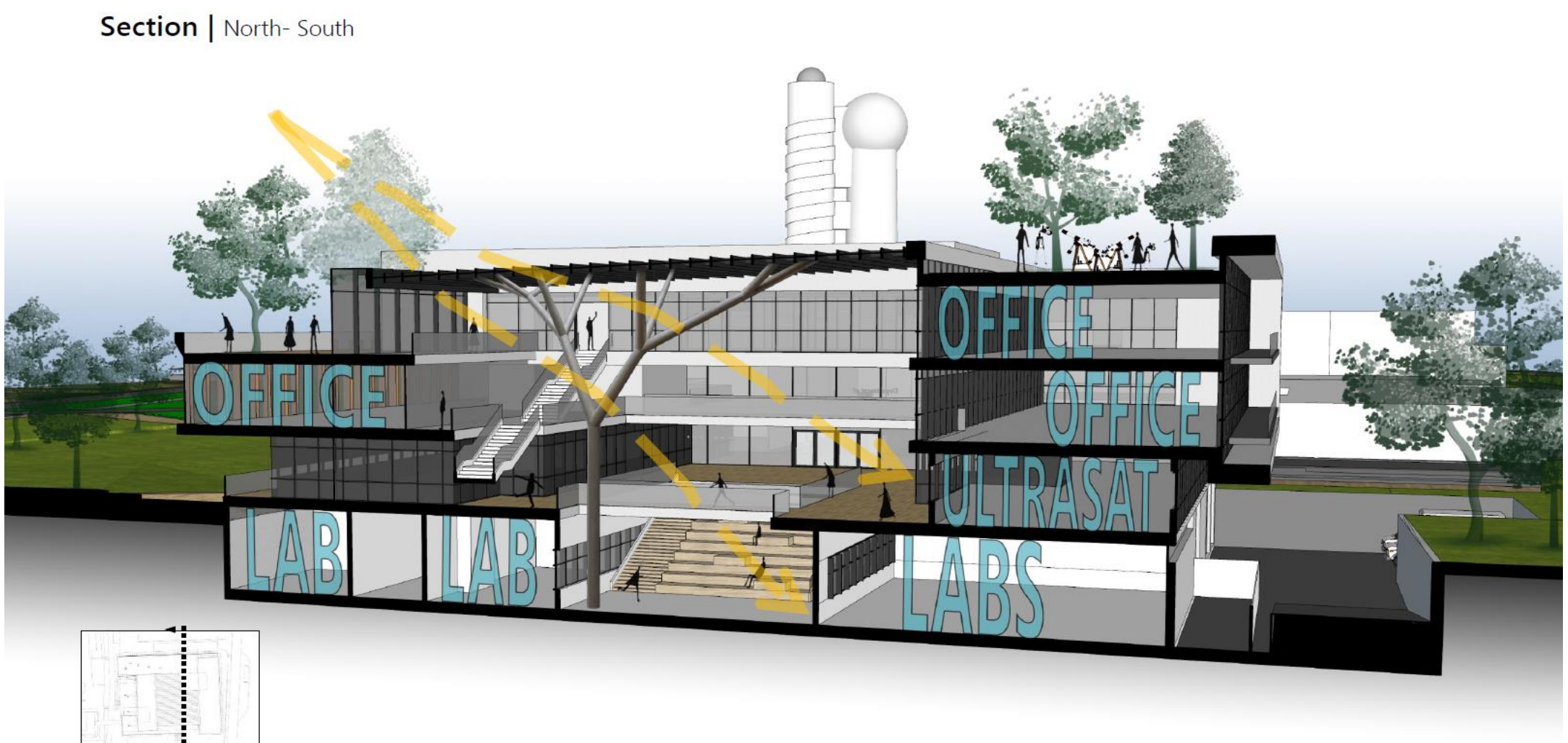
Transition to the new DPPA building

- New building for the department of particle physics and Astrophysics
  - Construction start next year and will take ~3 years
- We are going to get a 850m² laboratory
  - Double than what we have today

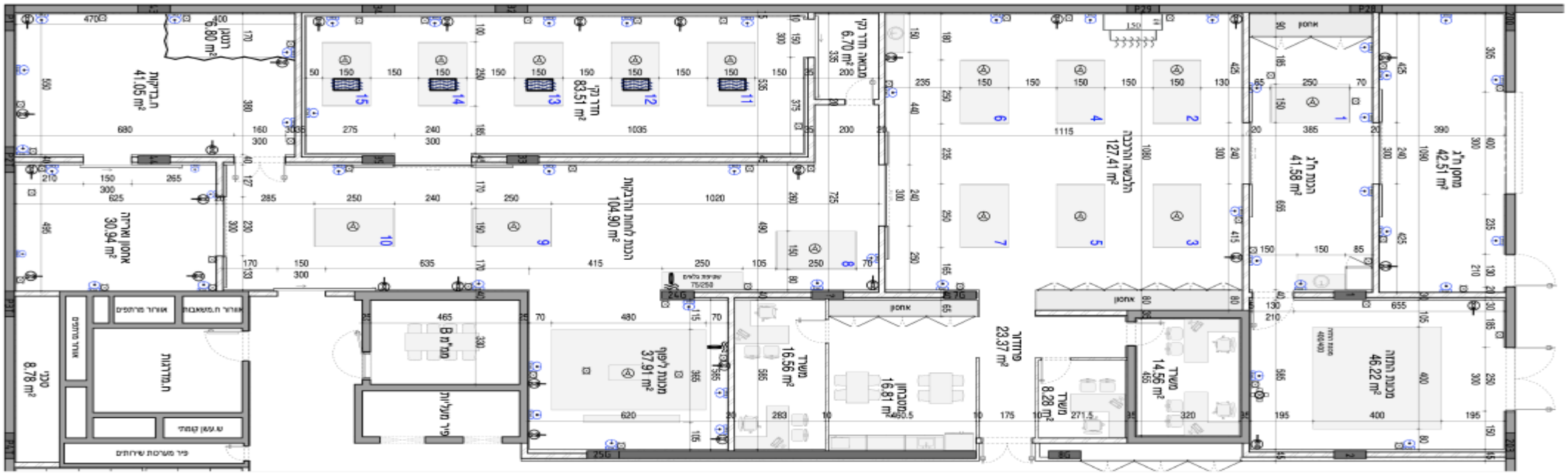
- We will have all the facilities that we have today, but bigger and better

The new building

The new lab


Section | North- South
OFFICE
OFFICE
OFFICE
ULTRASAT
LAB
LAB
LABS
מכון ויצמן למדע
WEIZMANN INSTITUTE OF SCIENCE
MYS
ARCHITECTS

New lab

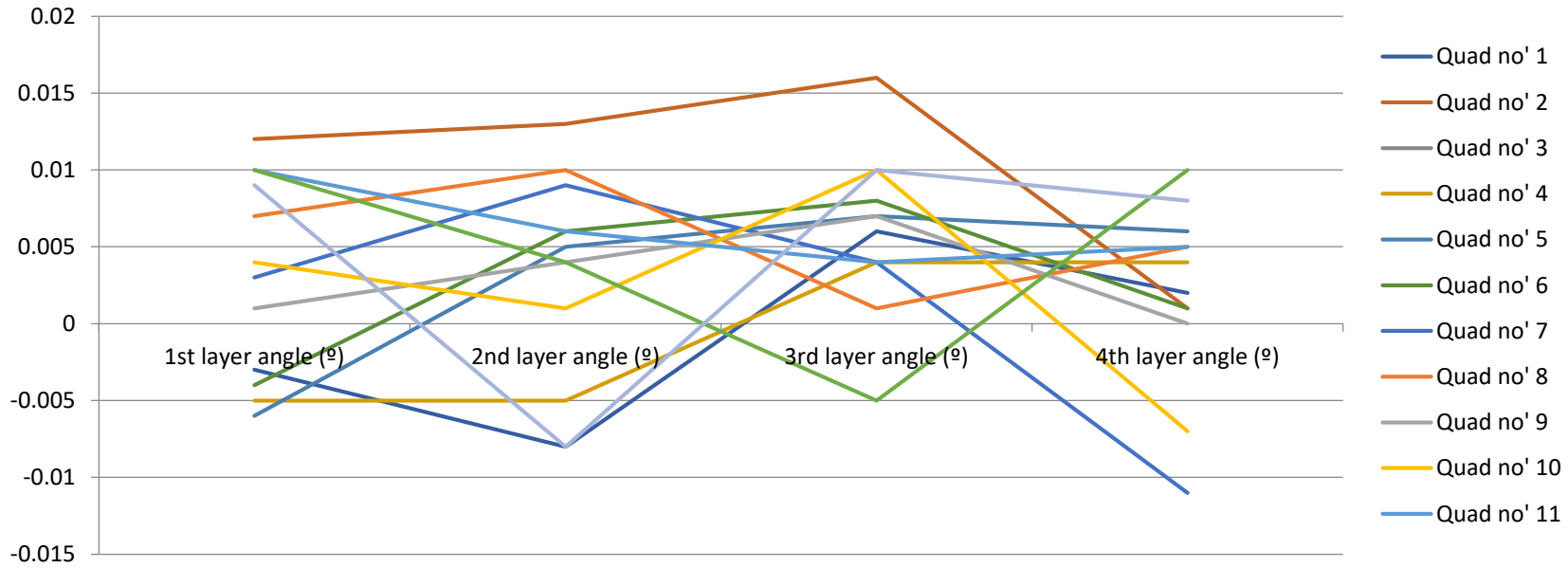


END

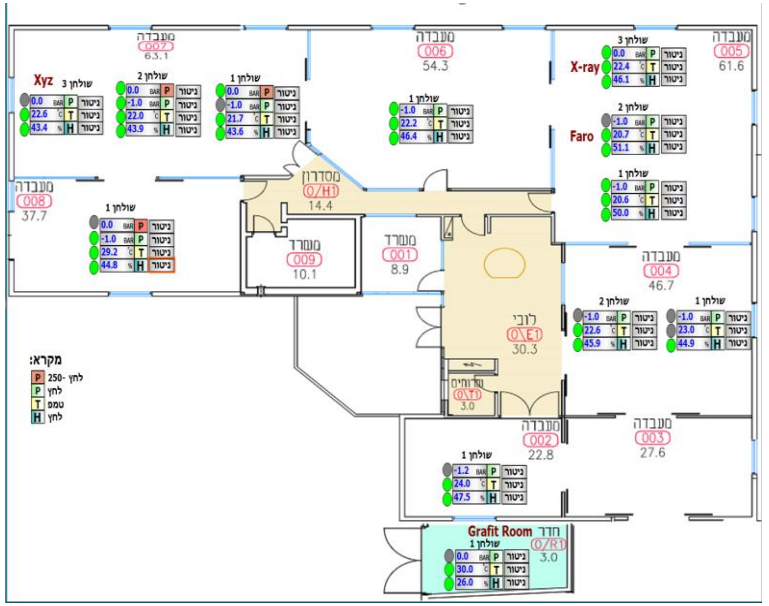
Thanks

Angle (Using the Faro arm)

	Quad no' 1	Quad no' 2	Quad no' 3	Quad no' 4	Quad no' 5	Quad no' 6	Quad no' 7	Quad no' 8	Quad no' 9	Quad no' 10	Quad no' 11	Quad no' 12	Quad no' 13
1st layer angle (º)	-0.003	0.012		-0.005	-0.006	-0.004	0.003	0.007	0.001	0.004	0.01	0.01	0.009
2nd layer angle (º)	-0.008	0.013		-0.005	0.005	0.006	0.009	0.01	0.004	0.001	0.006	0.004	-0.008
3rd layer angle (º)	0.006	0.016		0.004	0.007	0.008	0.004	0.001	0.007	0.01	0.004	-0.005	0.01
4th layer angle (º)	0.002	0.001		0.004	0.006	0.001	-0.011	0.005	0	-0.007	0.005	0.01	0.008

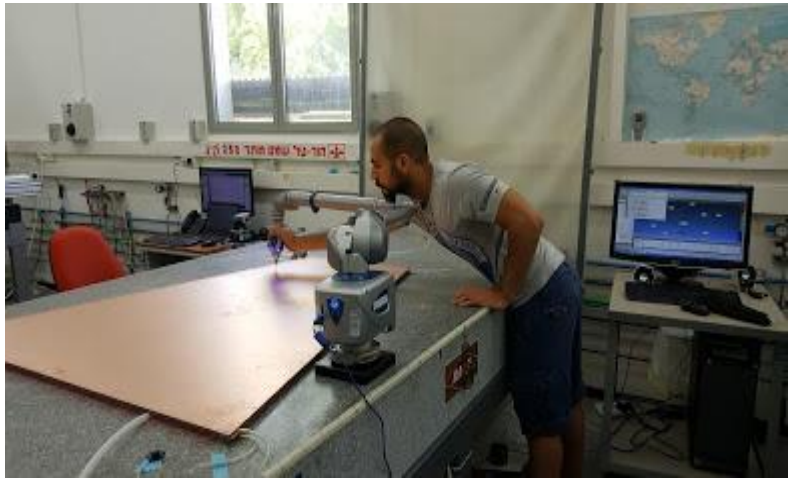


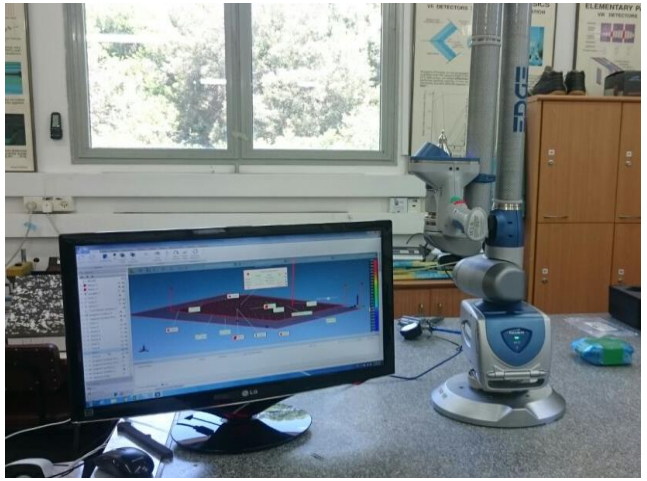

FARO


מעבדה
007
63.1
מעבדה
006
54.3
מעבדה
005
61.6
X-ray
Faro
Xyz
מסדרון
0/H1
14.4
מעבדה
008
37.7
מחסן
009
10.1
מחסן
001
8.9
מעבדה
004
46.7
לובי
0\E1
30.3
שרותים
0\T1
3.0
מעבדה
002
22.8
מעבדה
003
27.6
חדר Grafit Room
0/R1
3.0
מקרא:

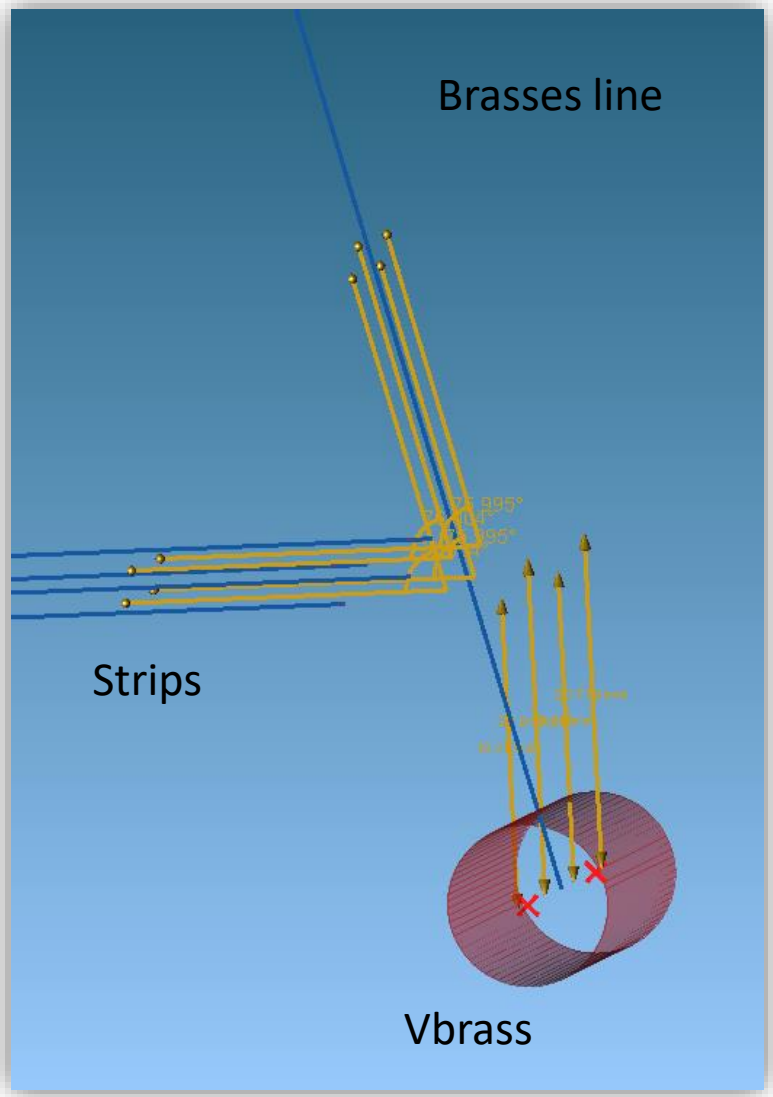
FARO ARM

- This arm can move 2.7m around the connection point and measure any object by either touching points or scan it with laser.
- Precision of the Faro is 27 Micron max.
- We use the Faro for measuring cathode boards and also for final alignment test of quads.

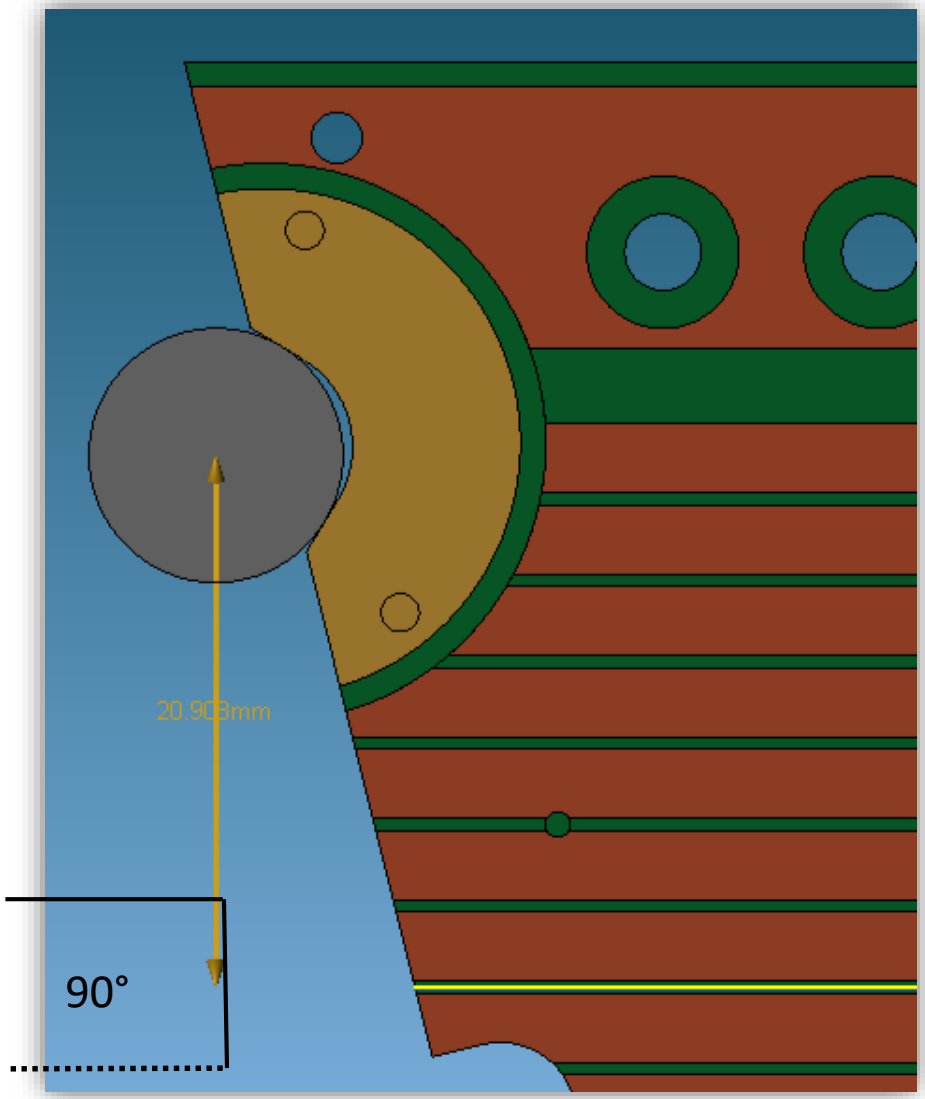




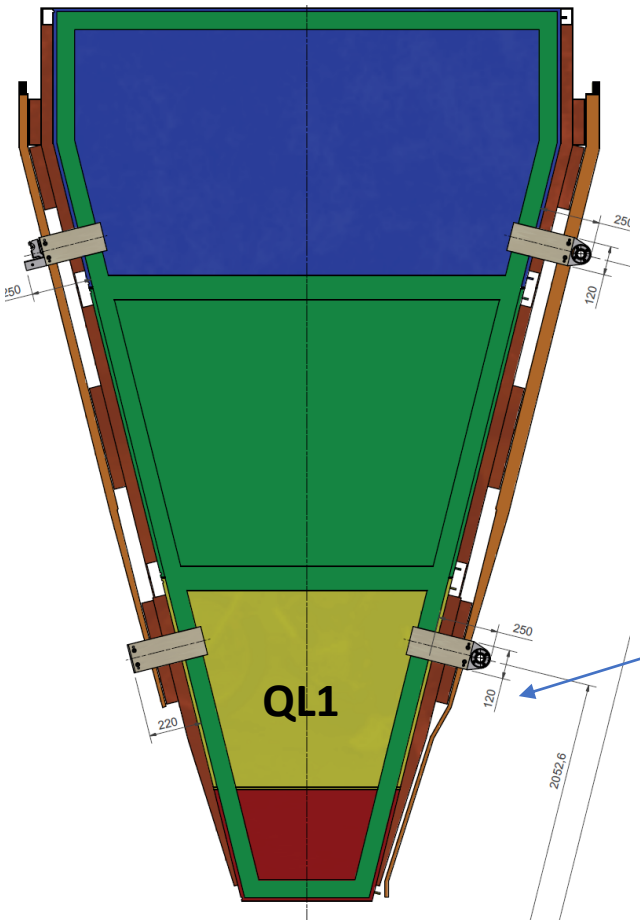
Isometric view actual measurement



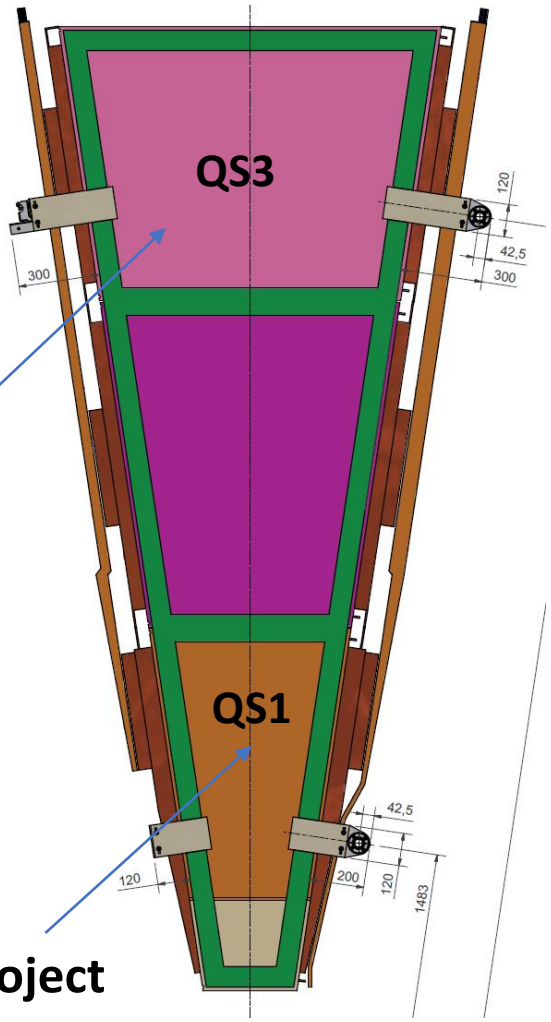
The nominal distance between Vbrass to strip at 90°



NSW



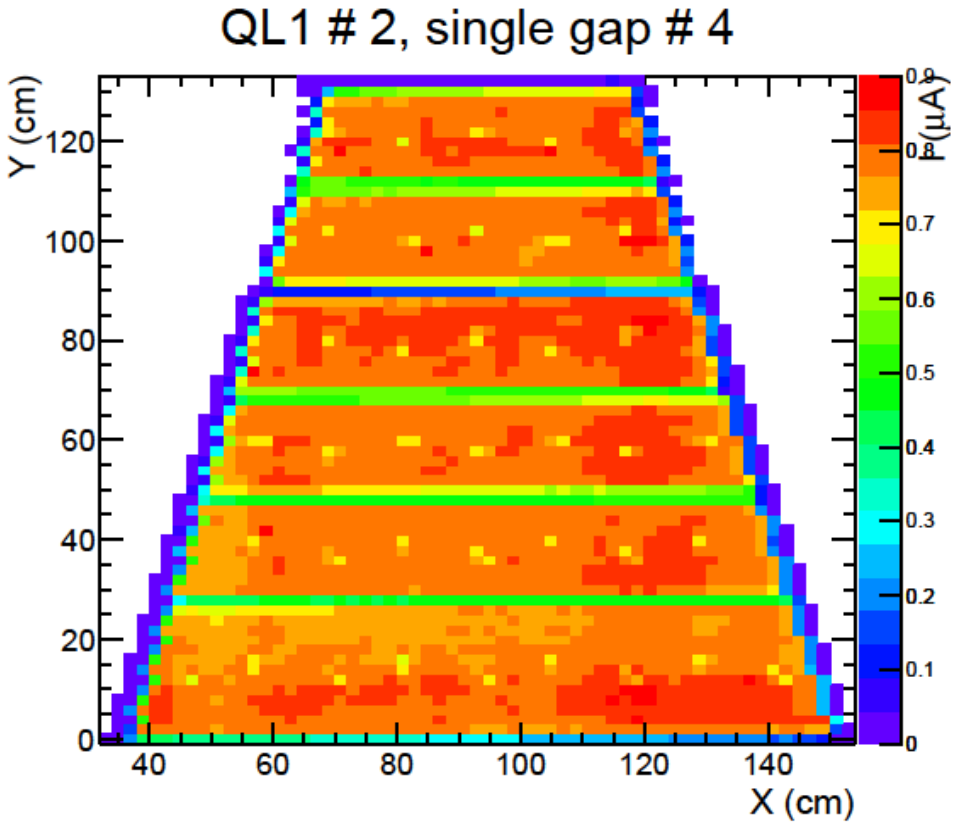
Our major responsibility
was to produce 60 quads.
40 of type QL1
20 of type QS3



4 QS1 added in
the end of the project

IRRADIATION OF X-RAY MACHINE

- All the detectors and material pass x-ray irradiation to check long term stability and week points



LAB contribution at CERN

- Replacement and maintenance of TGC’s on the big wheels
- Testing detectors at CERN including Beam test and GIF
- Experts technician with