



Calorimeter Mechanics Status

- **Parts construction**
- **Integration**

Fabio on behalf of the mechanics group

Outline

Status of the construction of all the Calorimeter parts

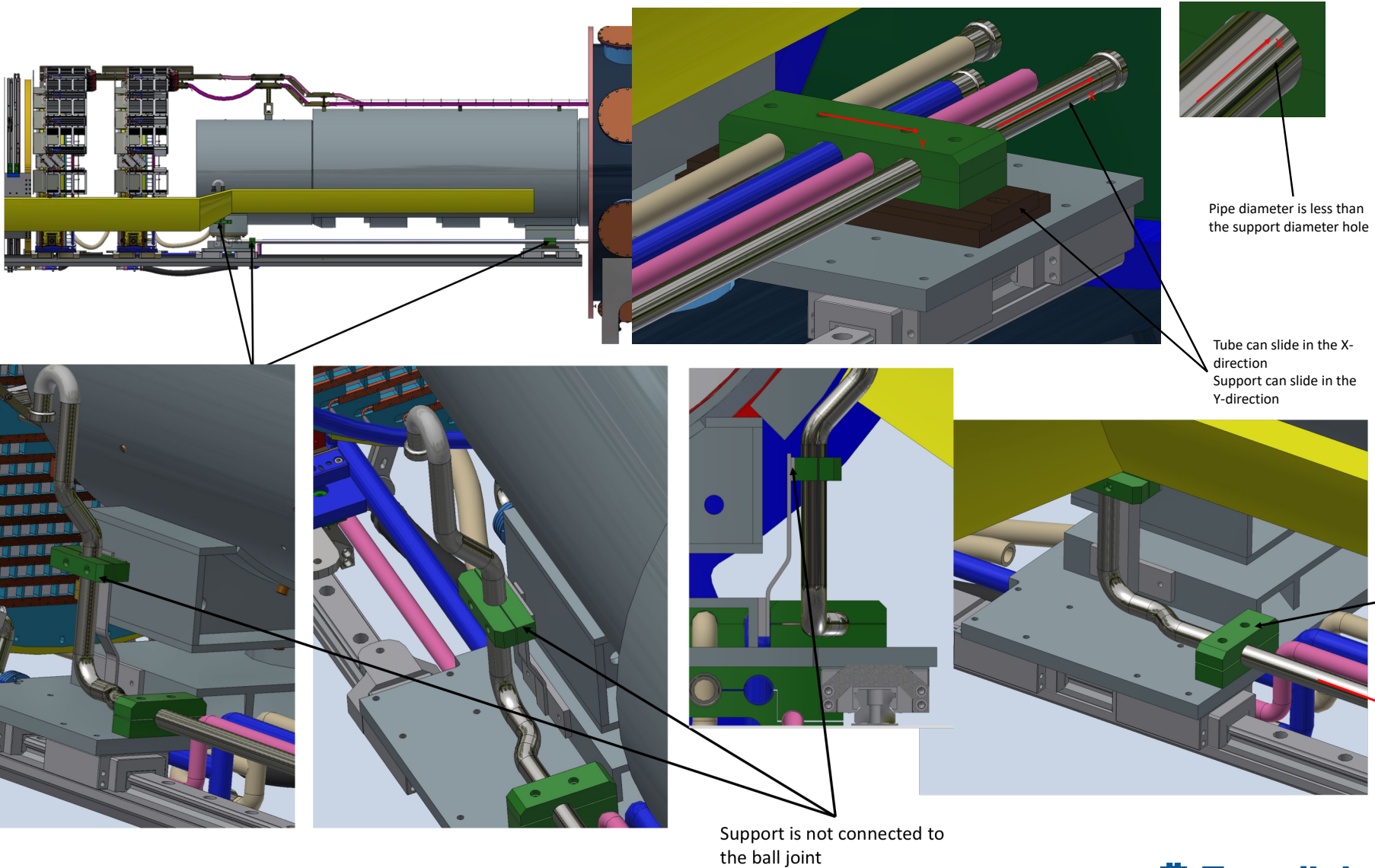
- Outer cylinders
- Feet
- Carbon Fiber Source plate- **Fabrizio- Daniele**
- Carbon Fiber Inner stepped Cylinder
- Sipm HOLDER
- Sipm gluing
- FEE plate - **Fabrizio**

- Crates - **Fabrizio**
- Assembly Stands
- Outgassing vessel

Integration

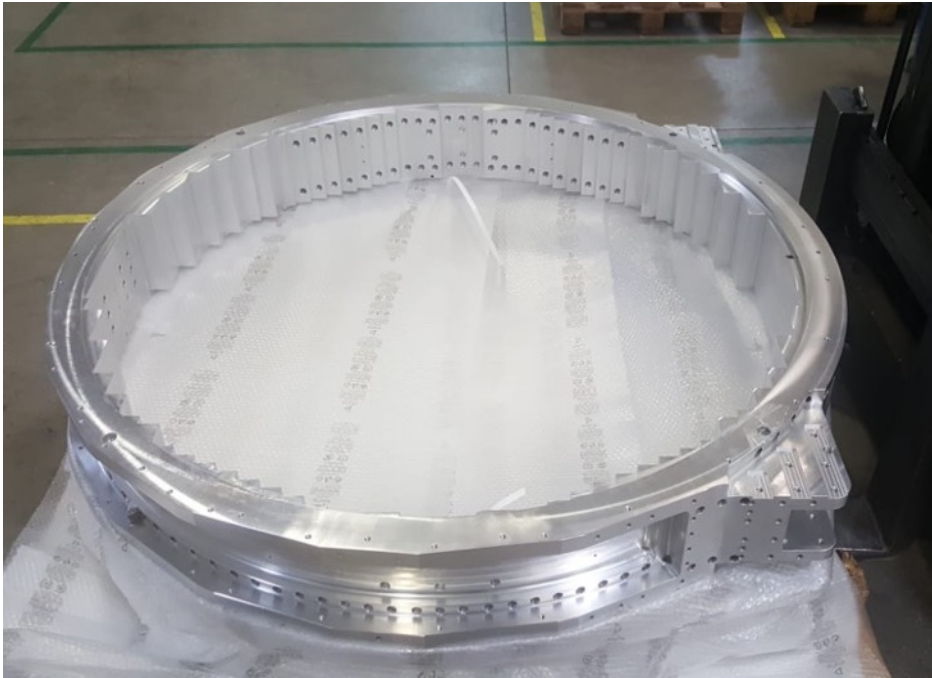
- working on the layout of the cooling pipes and services in the cryostat and through the IFB
- Russ asked about the connection of the cooling pipes section during maintenance.
- the support for the tracker cables on the calorimeter side is designed and being discussed with Ginther

Pipes integration

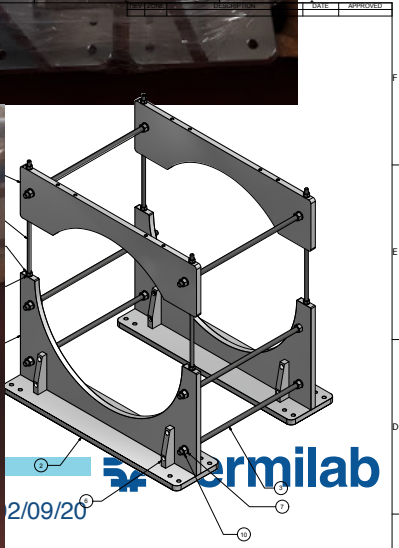
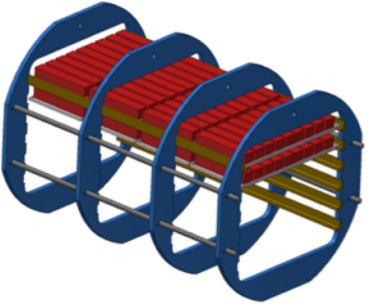
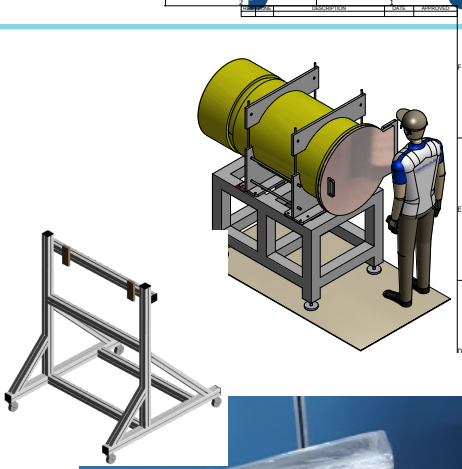


Piling up parts @LNF

Outer rings, ready to be shipped

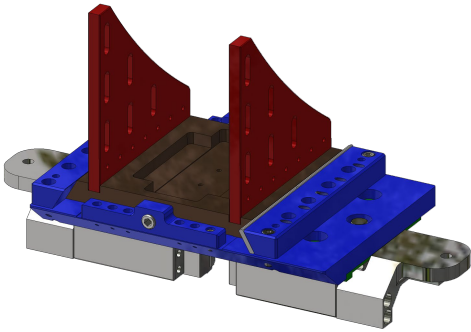


Outgassing setup – everything ready.



Feet construction @LNF workshop

- Procured all the material (but bronze) to manufacture the feet and the X-Y regulation wedge. Assessed magnetic permeability properties

BILL OF MATERIALS								
Project: Mu2e experiment Detector: EM Calorimeter Assembly number: Mu2e 02 00 00 – 00 Assembly name: Foot Date: 05/01/2020								
1.1 Raw materials								
Drawing number	Part name	Material	Q.ty [unit]	Dimensions [mm]	Weight [kg/unit]	Price	Amount	BOM notes
Mu2e 02 00 00 - 01	Nut	AISI 316L	4	20x30 - L=165	1			EN 1.4404 Certification to EN 10204
Mu2e 02 00 00 - 02	Nut	AISI 316L	8	15x25 - L=65	0.2			EN 1.4404 Certification to EN 10204
Mu2e 02 00 00 - 03	Wedge	AISI 316L	4	6x30 - L=240	0.04			EN 1.4404 Certification to EN 10204
Mu2e 02 00 00 - 04	Guide	AISI 316L	4	25x40 - L=240	1.92			EN 1.4404 Certification to EN 10204
Mu2e 02 00 00 - 05	Guide	AISI 316L	4	25x40 - L=240	1.92			EN 1.4404 Certification to EN 10204
Mu2e 02 01 00 - 01	Base plate	AISI 316L	4	265x355x30	22.6	33.27 CHF/kg	3008 CHF	1.4429 (316LN)-UHV applications-EDMS 790774 (The relative magnetic permeability at room temperature after solution annealing shall be lower than or equal to 1.005 for fields of over 80

Feet material... ,all but bronze, arrived from CERN

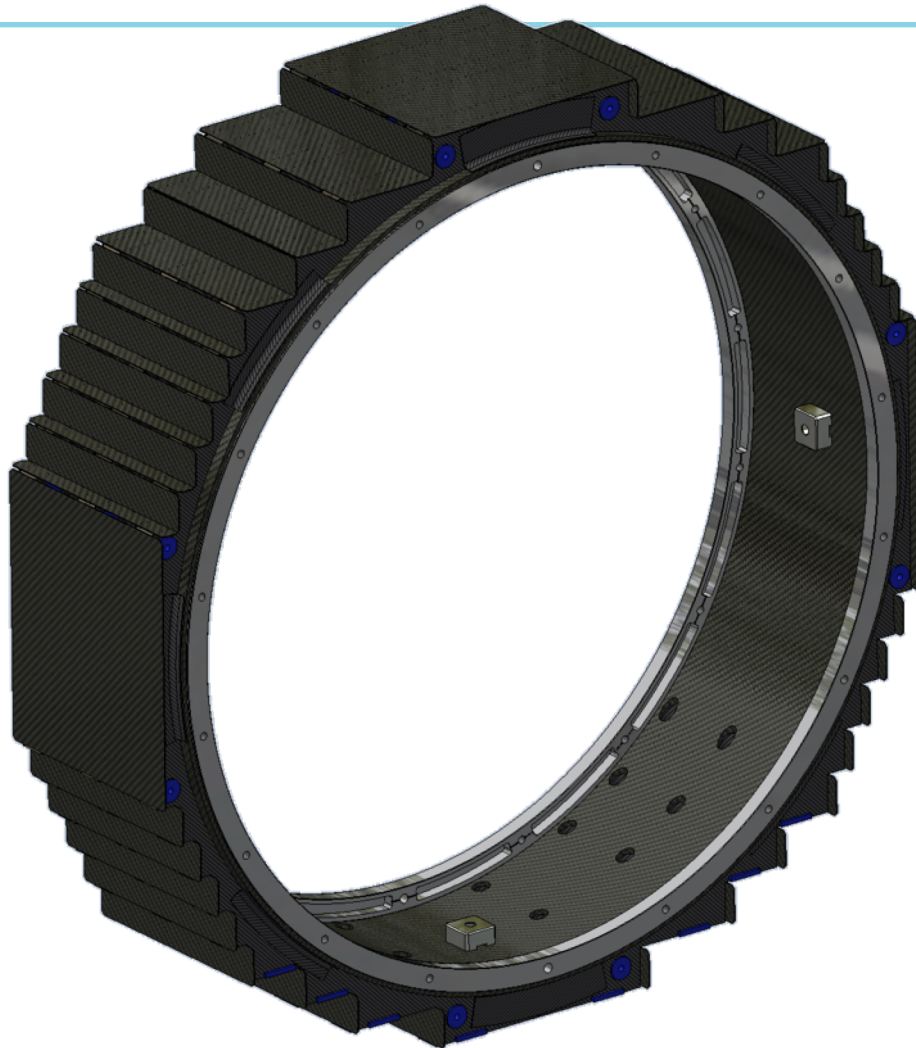


								000 A/m) - CERN ref. 44.59.32.630.6 - 33.27 CHF/kg
								EN 1.4404 (AISI 316L) – CERN ref. 44.59.40.130.4 - 32.42 CHF/kg
								Same price
								CERN ref. 44.86.75.125.3
								CERN ref. 44.88.75.180.4
								Certification to EN 10204
						265 CHF/unit + 165 CHF certification	1225 CHF	
Mu2e 02 03 00 - 02	Lateral Plate	AISI 316L	8	205x210x15	5.2	33.98 CHF/kg	1413 CHF	1.4429 (316LN)-UHV applications-EDMS 790774 (The relative magnetic permeability at room temperature after solution annealing shall be lower than or equal to 1.005 for fields of over 80 000 A/m) - CERN ref. 44.59.32.615.5 - 33.98 CHF/kg EN 1.4404 (AISI 316L) – CERN ref. 44.59.40.115.3 - 46.63 CHF/kg

1.2 Standard Components

Drawing number	Part name	Material	Q.ty [unit]	Dimensions [mm]	Weight [kg/unit]	Price	Amount	BOM notes
Mu2e 02 03 00 - 00	Skid	A4	56	ISO 4762 M8x25				

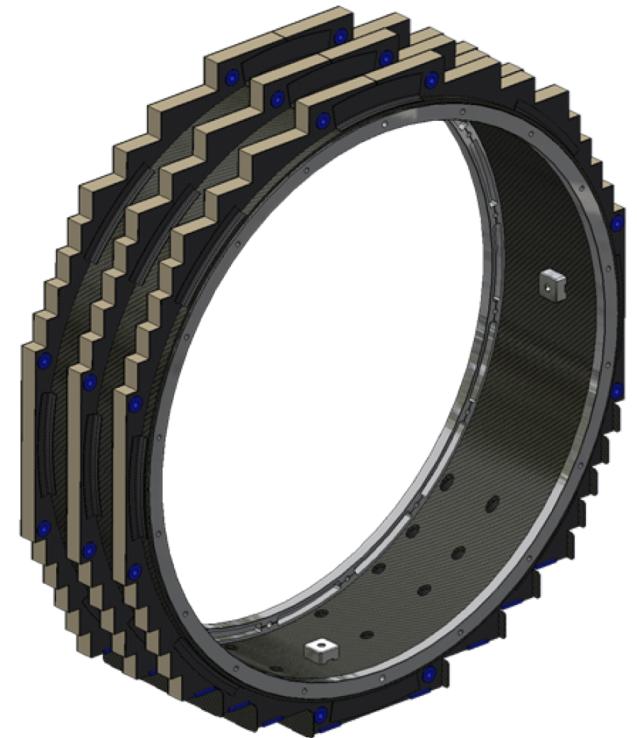
Inner Cylinder: overview



The Inner Ring consists of:

- a cylinder made of low density CF
- three steps made of low density CF
- two rings made of aluminum needed to joint the back and front plates to the inner ring
- Vertical and horizontal planes made of CF

All components are glued together.



Source Pipes

Luke just sent me some pictures of the welded assemblies! All the thin wall welds are done, they just have four more welds on the manifolds, and leak checking. Luke is meeting with the shipping company likely Thursday.

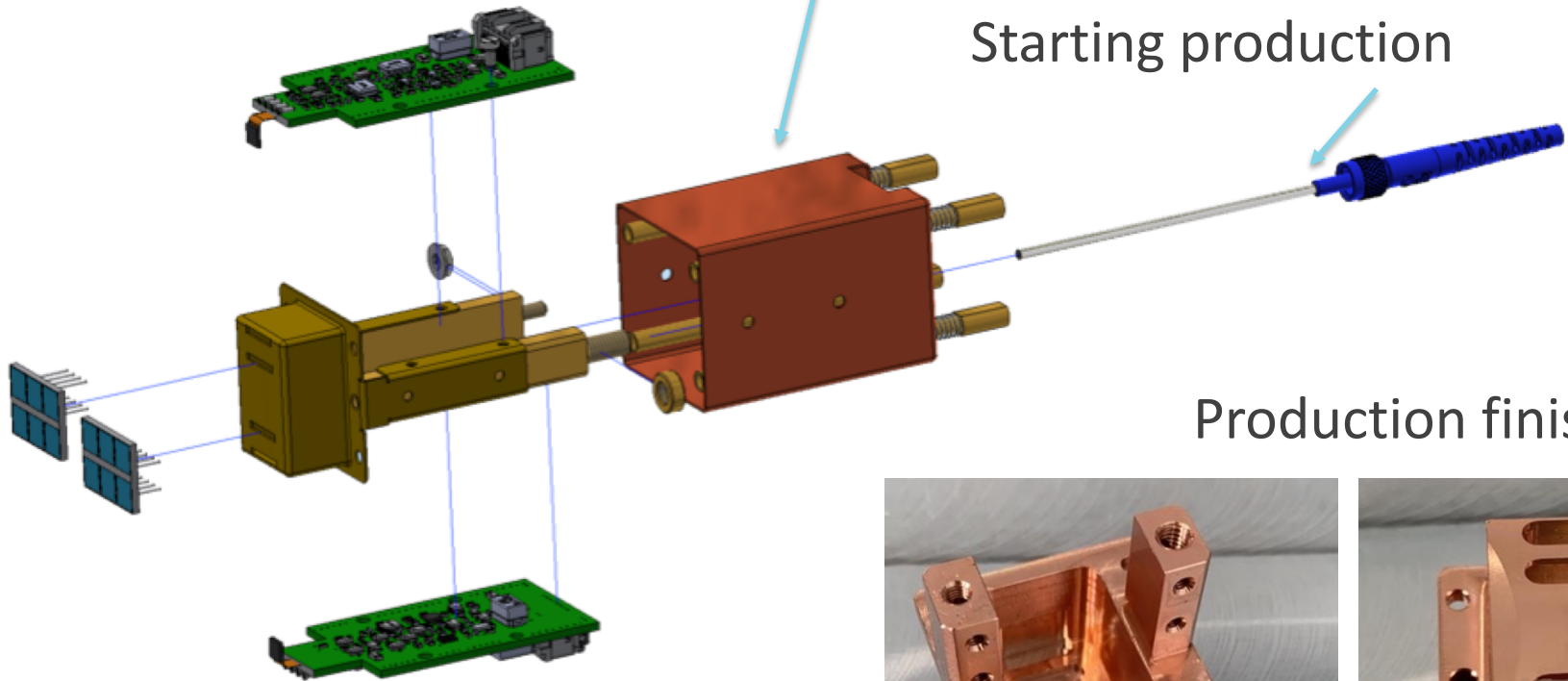
We will advise CETMA



SiPM+FEE holder

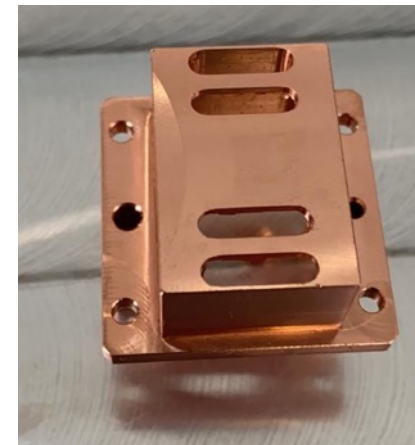
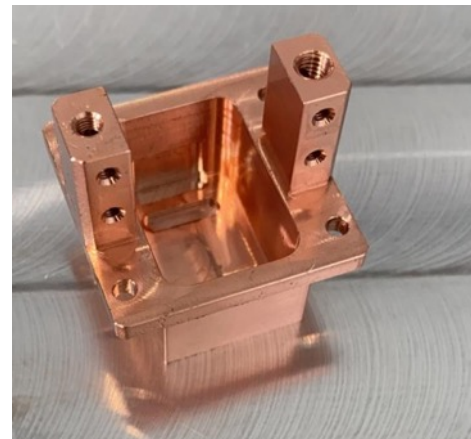
Company producing the faraday cage
Being added in the Fermilab Supplier list

Finalized the fiber needle length
Starting production



Production finished

The Faraday cage will be made of
extruded copper – Tender out



SiPM holder: left to do

- Faraday cage: Romana Stampaggi has been included in the Fermilab supplier database
- Fiber needle dimensions are being assessed and the production will start soon

Holder marking



- We are marking the SiPM holders in Fracati. Use the tool also for cables at FNAL

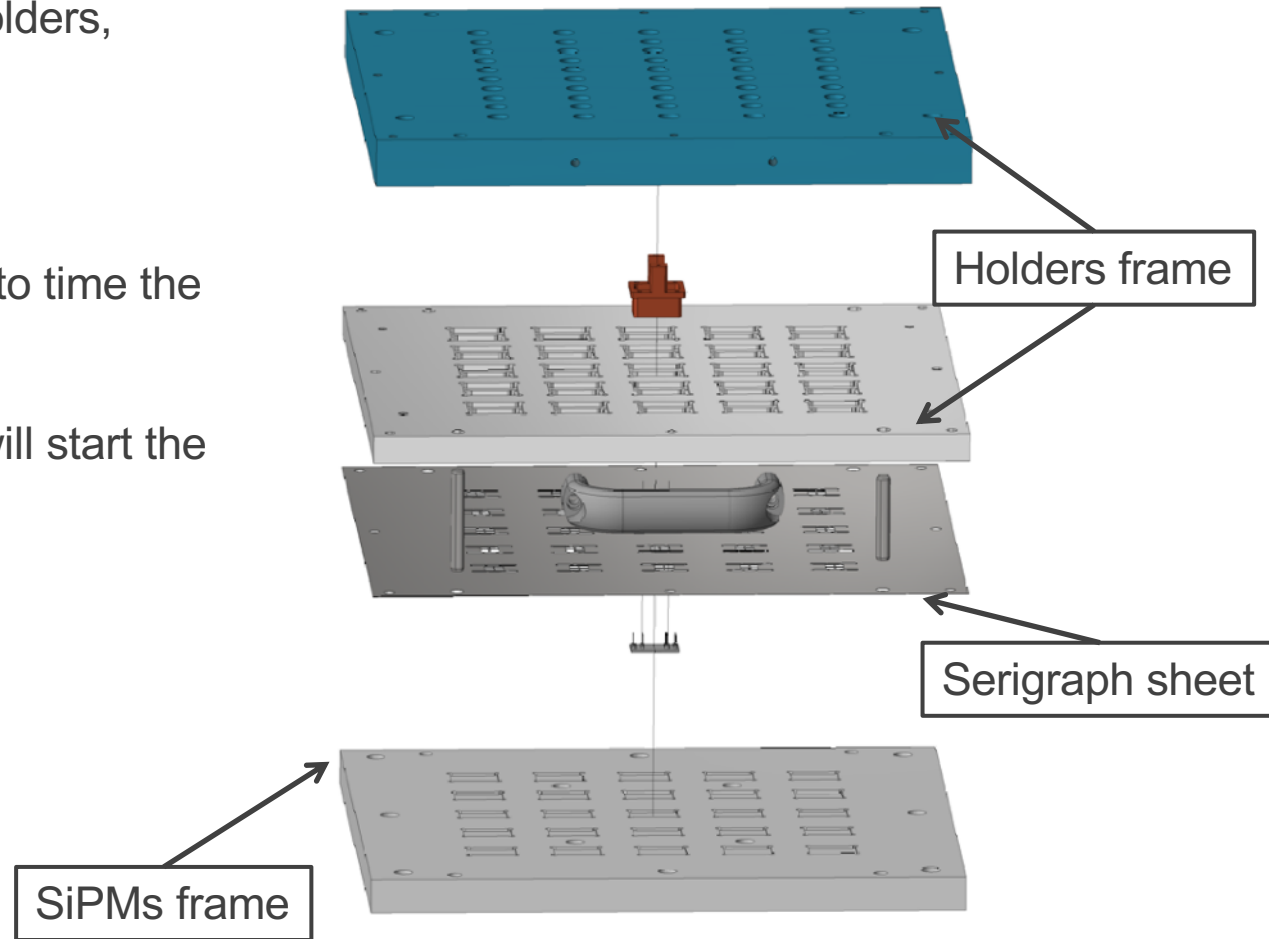
Gluing procedure

We bought 5 3cc Syringes to do some gluing test @LNF. We Have Holders, SiPMS and gluing tools.

We bought a -50C refrigerator

We are waiting for its delivery to time the shipment of the glue.

Once we have everything we will start the final gluing test (September)



Gluing

- Refrigerator arrived Yesterday. Turned on.
- Green light for the glue shipment
- It should be here by the end of this week, beginning of next
- We will start gluing the SiPM for the Module-0 revamping with final electronics

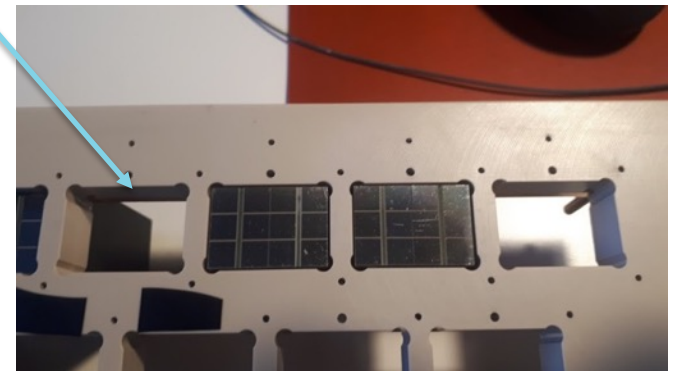
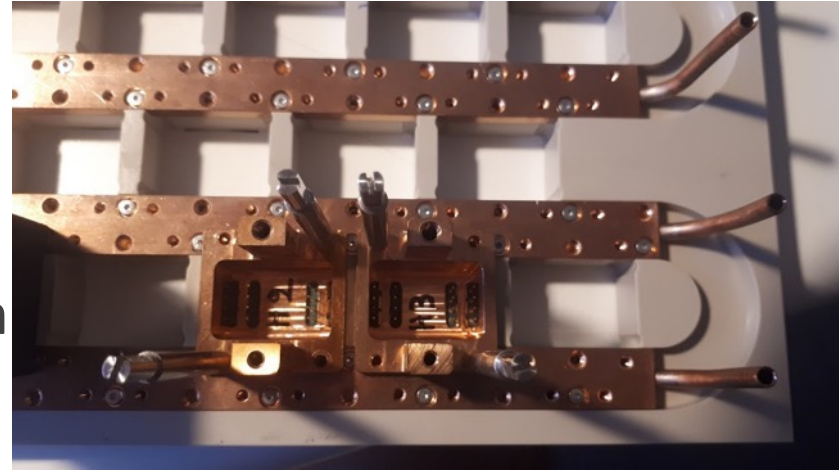
Status of construction of FEE plate.

We have built a portion of the final design FEE plate and made some tests:

- coupling to holders
- Light leaks

@LNF we noticed a tiny (150micron) shift in the Sipm positioning with respect to the center of the plate windows that is due to some misalignment of the copper bars with respect to the PEEK Plate and tolerances on the holders or both. Machining...Investigating....

We shipped back the prototype to CINEL



Status of manufacturing and dates @FNAL

- ✓ Outer Al cylinders → **completed and QA tested**
- ✓ Feet – Material @LNF. Mechanical shop estimating feasibility and dates
- ✓ FEE plate – under construction → **Dec 2020**
- ✓ Inner CF cylinder – under construction → **Nov 2020**
- ✓ Source Plate – under construction → pipes at Cetma Sep 2020.
Nov 2020
- ✓ Crates – under construction → **Nov 2020**
- ✓ **SiPM Holder** → **completed and QA tested**
- ✓ Faraday cage – Found the company –copper extrusion→ **Oct 2020**
- ✓ Fiber guide – order about to go out → **Oct 2020**
- ✓ Cable trays – detailed drawing done → beginning 2021
- ✓ Assembly stand – **Material at FNAL** → **Sep 2020**
- ✓ **Patch Panel** – detailed drawing → **Oct 2020**
- ✓ **Lifting tool** – Drawings almost ready → **beginning 2021**

Plan

If we can travel soon (October) and If people are wishing to travel

- Ship parts
- Install the stand
- Start gluing the SiPM