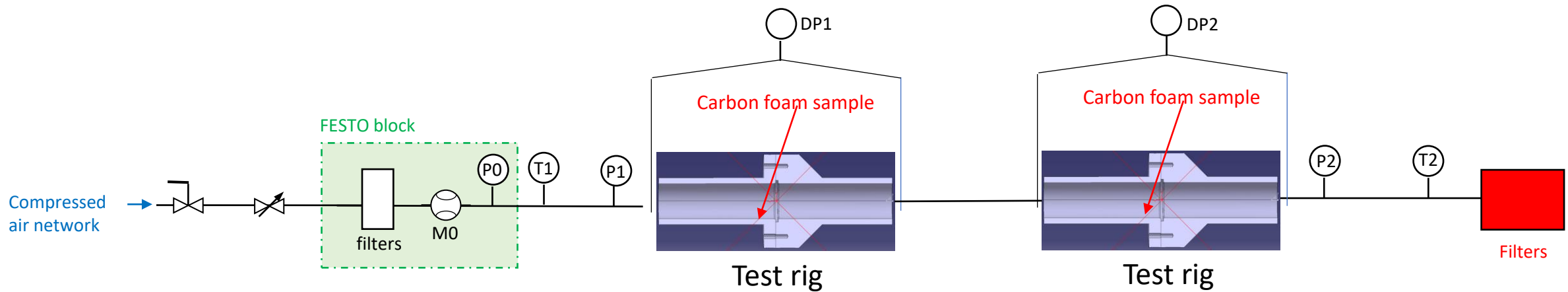




- It is known that carbon foams release powder when manipulated with hands.
- The air flow can create the same effect when passing through the foams.
- Tests performed up to now do not show any major consequence.
  - Characteristic times of minutes, while the ITS3 will run 24/7 during many months.
  - It is important to study the long term effects.
- A setup dedicated with this topic is currently being installed to answer questions:
  - Size and shape of the particles (protection of wire bonding).
  - Risk of structural failure caused by possible degradation
  - If the behavior is different in the RVC and K9 foams or not.

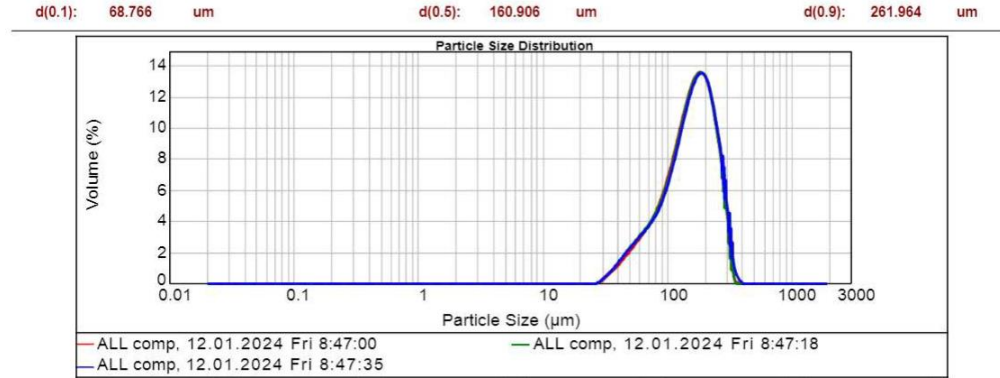


Foam samples

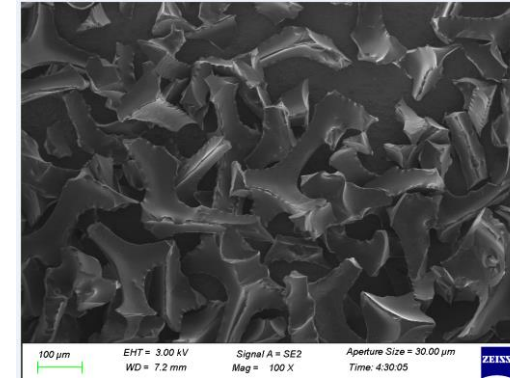
- Air flow generated by the compressed air network of CERN.
- Initial festo block with filters, mass flow meter (M0), and pressure sensor (P0).
- Two foam samples representing the pressure loss of ITS3 layers.
- Differential pressure sensors to measure the foam pressure loss over time.
  - Significant erosion → Lower pressure loss.
- Temperature sensors at inlet (T1) and outlet (T2) (ideally ALICE cavern temperature conditions).
- Additional absolute pressure sensors at inlet (P1) and outlet (P2) to verify data given by other sensors.
- Filters (pre-filter and fine) to collect the released powder
  - Initially powder collected every day, next steps based on the results
- All sensor output values to be read in LabView, exported to a .dat file to check daily or weekly the status.
- Installation at Point 2 (piscine) due to continuous demand of air for a long time, noise, and space reasons.
  - Continuous operation during months

## 1. Particle shape and size.

- Powder samples (obtained by disintegrating the foam by hand) produced for first test.
- Samples sent to UniversalLab (CH) → Particle size distribution (Laser diffraction for high quantities, microscope images for low quantities)



Particle size distribution of Allcomp powder



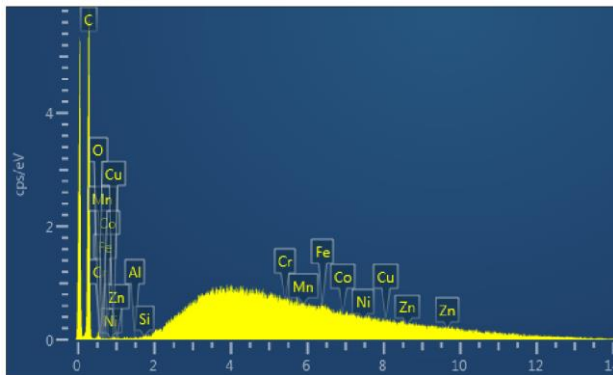
SEM image of RVC powder

## 2. Particle composition (UniversalLab, possible to do at CERN)

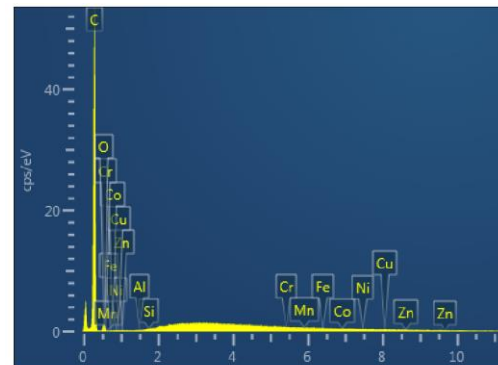
- XRD analysis (RVC not identified, non-crystalline).
- SEM analysis

No.	2θ, °	d, Å	Height, counts	FWHM, °	Int. I., counts°	Size, Å	Phase Name	Norm. I.
1	17.9(5)	4.94(15)	2415(7)	3.1(5)	1193(179)	27(5)	Unknown	2.74
2	26.463(5)	3.3654(6)	118723(280)	0.240(9)	43600(1005)	355(13)	Graphite: 0 0 2	100.00
3	42.357(3)	2.13216(16)	2955(26)	0.351(11)	813(15)	253(8)	Graphite: 1 0 0	1.86
4	44.66(3)	2.0273(14)	3057(24)	2.05(3)	3816(58)	43.9(7)	Graphite: 1 0 1	8.75
5	53.88(3)	1.7002(10)	1503(7)	1.74(6)	642(23)	53.4(18)	Unknown	1.47
6	54.492(5)	1.68255(14)	3870(38)	0.306(6)	1092(21)	305(6)	Graphite: 0 0 4	2.50
7	59.82(6)	1.5448(15)	1163(5)	1.78(6)	367(10)	53.8(19)	Graphite: 1 0 3	0.84
8	77.455(3)	1.23126(4)	2487(34)	0.172(3)	426(10)	619(12)	Graphite: 1 1 0	0.98
9	78.04(4)	1.2235(5)	870(5)	1.75(7)	362(12)	61(2)	Unknown	0.83
10	83.600(17)	1.1557(2)	1254(13)	0.811(18)	570(9)	137(3)	Graphite: 1 1 2	1.31
11	86.86(3)	1.1204(3)	876(6)	0.45(3)	111(5)	253(19)	Graphite: 0 0 6	0.25

XRD analysis of K9 foam

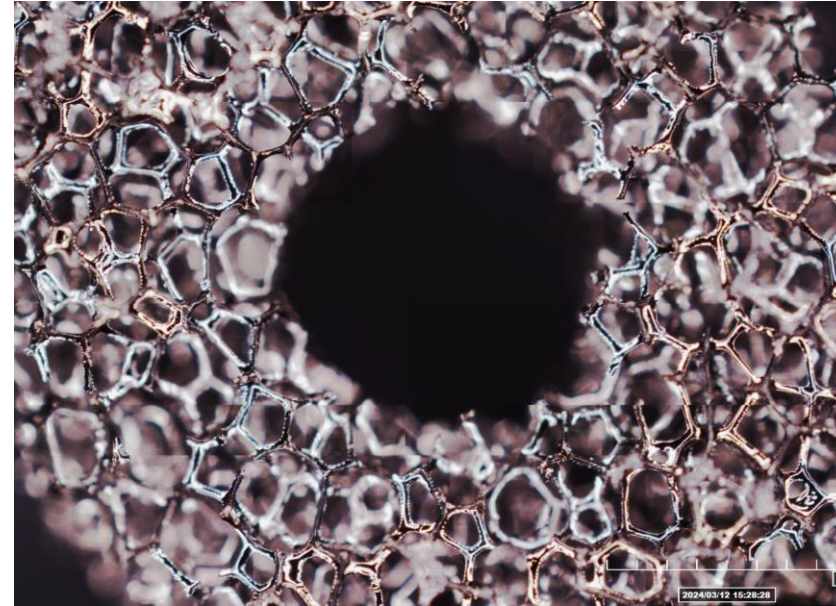
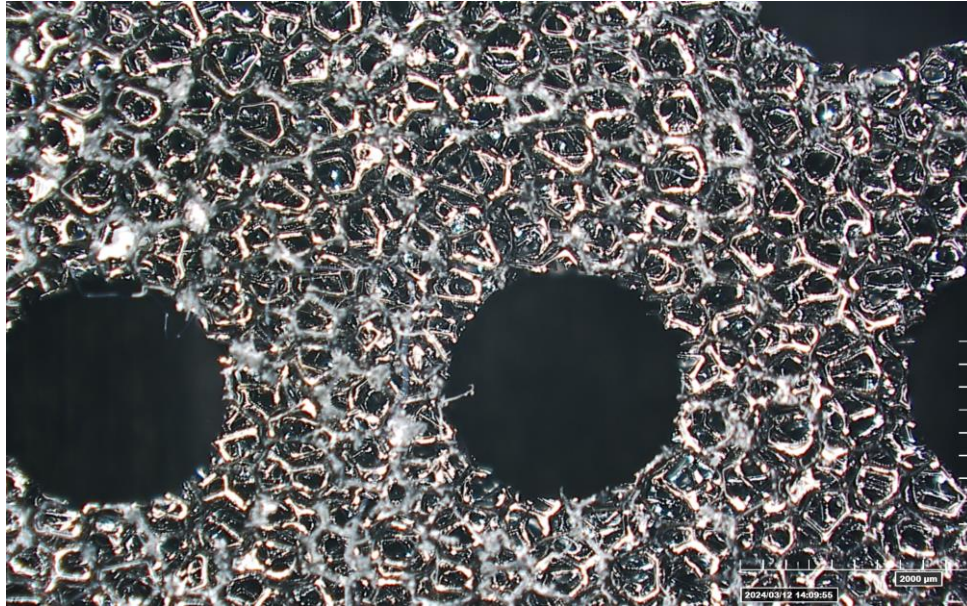


RVC



K9

3. Optical microscope images before and after of the carbon foam samples (CERN)
  - Images before tests already obtained



- Construction is progress

