



AIDA 2020

Advanced European Infrastructures
for Detectors at Accelerators

WP9 (NA8) PARALLEL MEETING

AOB:

(Apr 4th 2017)

- Brief news from other labs
- Status of Milestones and Deliverables

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654168.



- **1. Setup of a refrigerator closed circuit unit for CO₂ production**
- **2. Experimental setup for CO₂ boiling study in microchannel diam hy. 500-300-200 mm**
- **3. Prototype realization of hydraulic interface in peek material for carbon fiber microchannel (structure section 700 mmx700 mm, diam hy 300 mm)**



CO₂ Production UNIT (closed circuit)

Refrigerator Unit tested in December. Actually not running for problem on the PLC control of thermostatic valve. Repairing operation planned at end April.



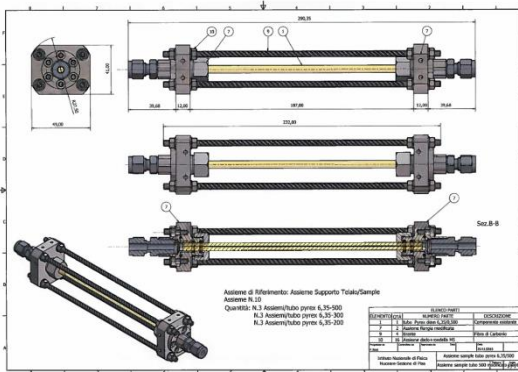
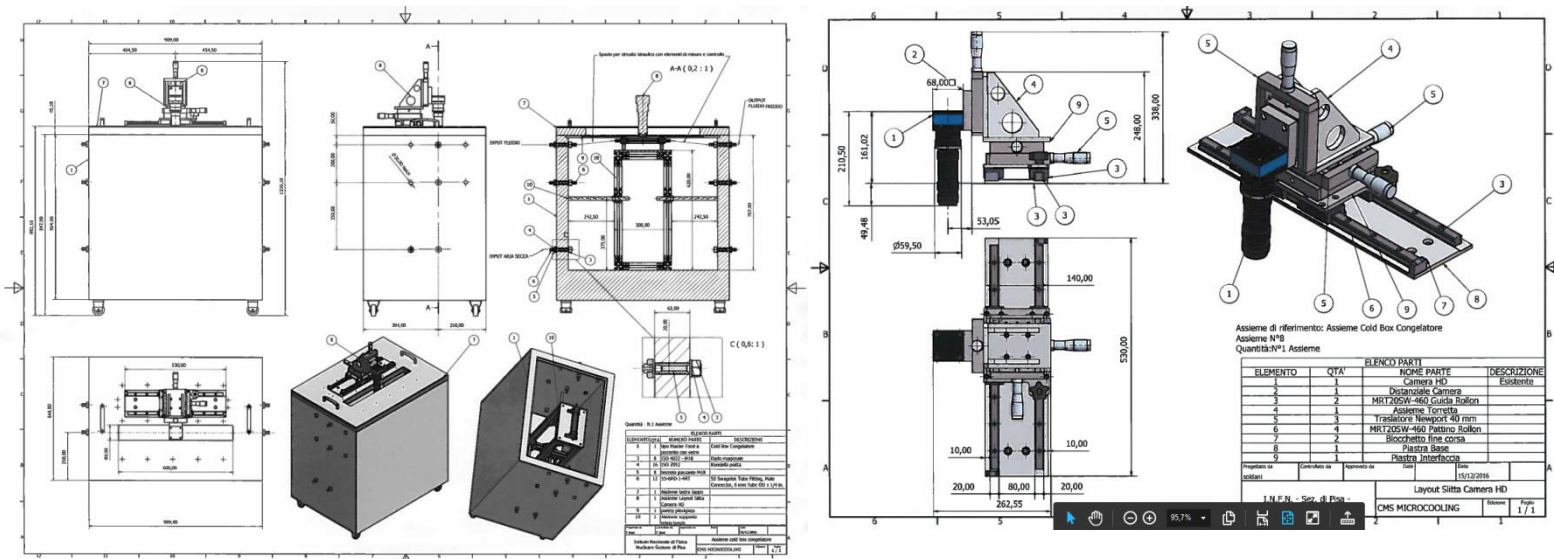
Figura 22: interno macchina



PRESSIONE DI CONDENSAZIONE [bar]	TEMPERATURA DI EVAPORAZIONE [°C]	POTENZA RAFFREDDAMENTO [W]	CONSUMO [W]	CORRENTE ELETTRICA [A]
82	-20	476	391	1,9
	-15	565	407	2,0
	-10	669	418	2,0
	-5	785	424	2,0
	0	916	426	2,0
	5	1062	424	2,0
87	10	1224	419	2,0
	-20	475	401	1,9
	-15	571	420	2,0
	-10	679	435	2,0
	-5	802	444	2,0
	0	940	449	2,1
92	5	1094	450	2,1
	10	1264	446	2,1
	-20	475	411	2,0
	-15	572	435	2,1
	-10	684	453	2,1
	-5	809	466	2,1
0	950	474	2,1	
5	1108	477	2,1	
10	1283	476	2,1	



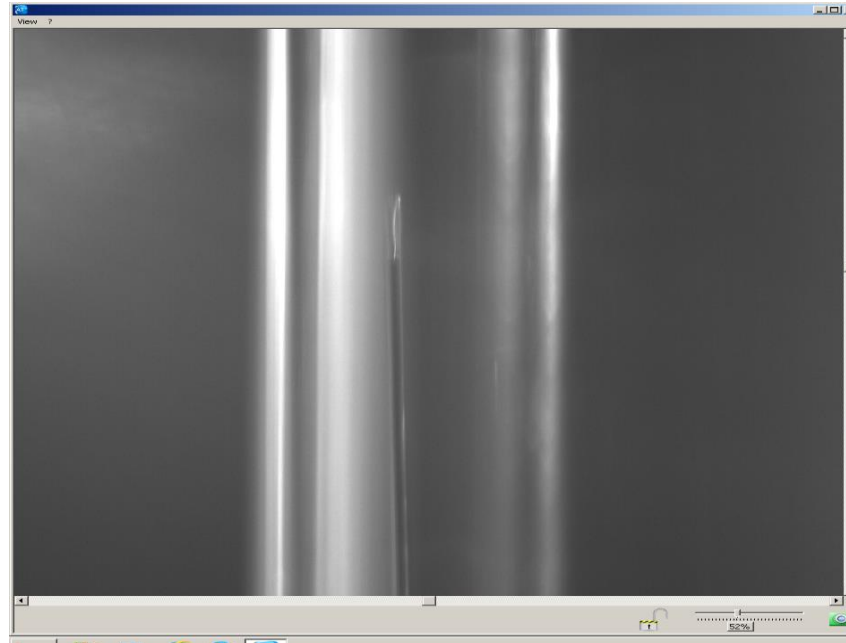
Experimental setup boiling study



Actually in production, ready in April.
Study on pyrex tube with the same hydraulic diameter of the carbon fiber microchannel tube.



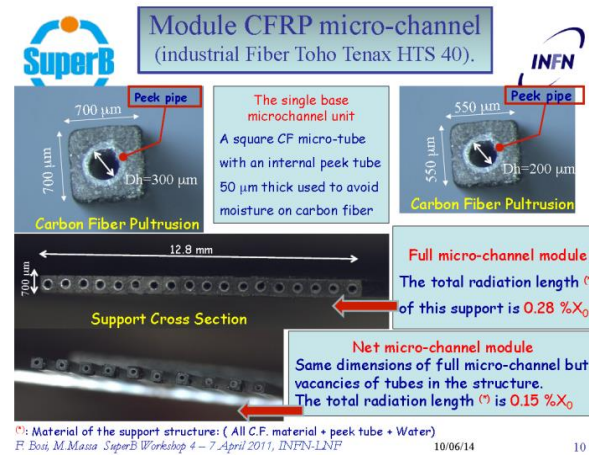
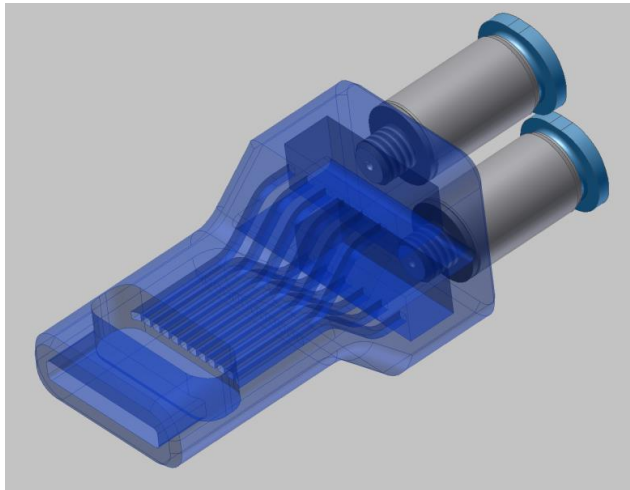
Recording system setup for nucleation study



Microchannel in a Pyrex rod, hydraulic diam. $500 \mu\text{m}$. For demonstration purposes, inside a wire of $25 \mu\text{m}$ as seen by the high resolution camera system able to record and stores dynamically for 40 sec the fluid flow .



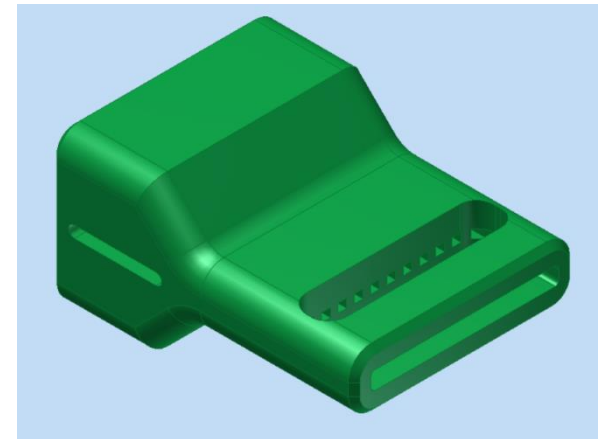
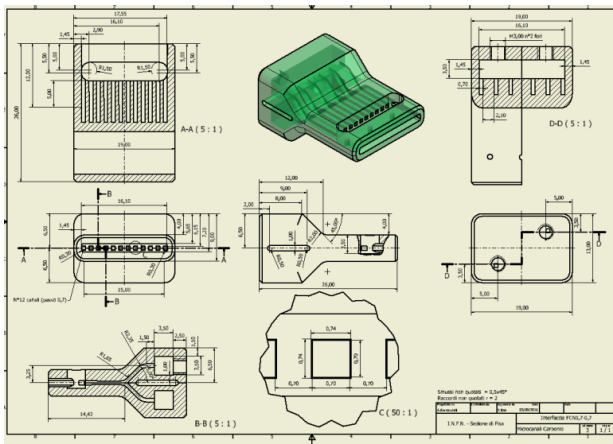
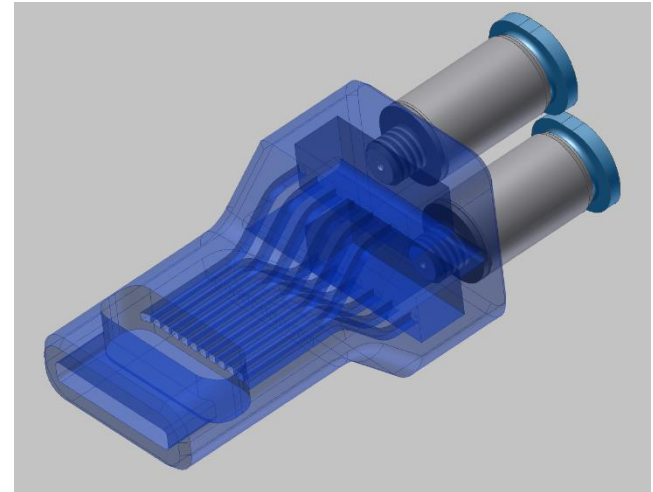
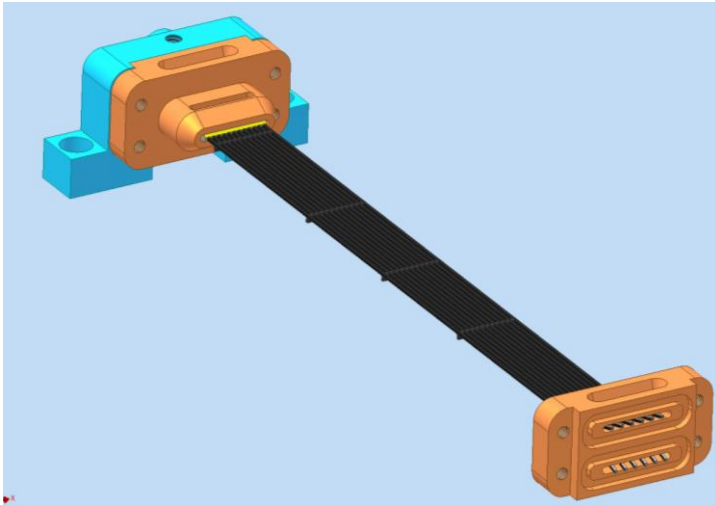
Hydraulic interface (manifold)



- First prototypes 3D printing in PEEK material of manifold suitable for microchannel carbon fiber structure not good due to the extreme miniaturization.
- Used a special nozzle of about 160 micron in diameter but problem during the melting process
- In progress further test and prototypes



Hydraulic interface (manifold)

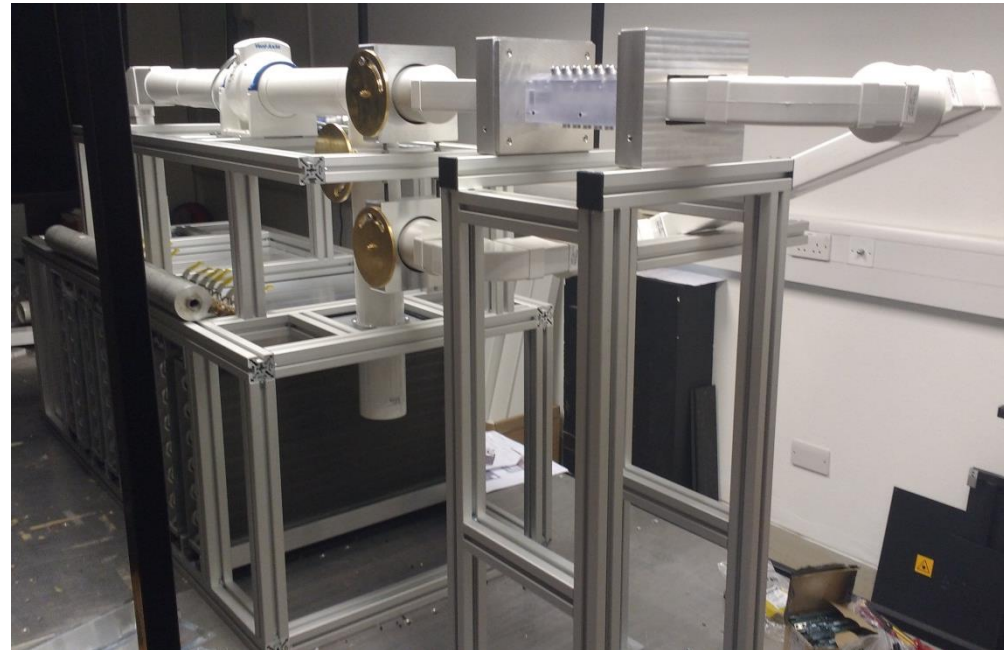
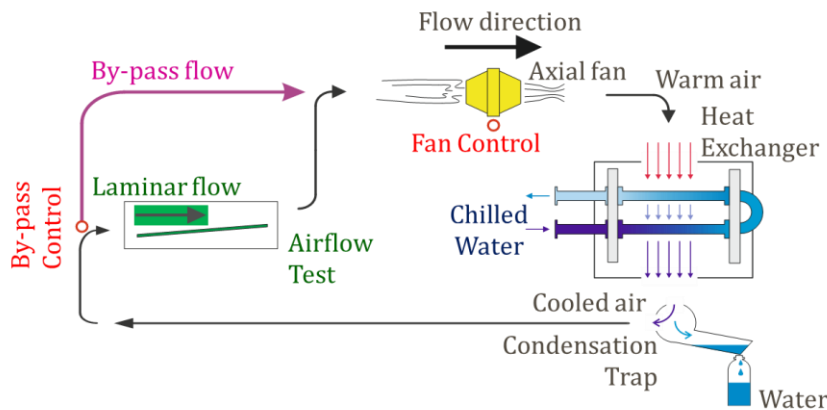




Air flow cooling setup

Good progress with air cooling rig: commissioning to start in April
Confirmed funding from UK funding agencies (total 205k£) for:

- Medium sized (for up to 1.5m long objects) climate chamber
- 8-line Frequency Scanning Interferometer for precision distance measurements
- Large optical table





• T 9.2 Milestones

	Milestone Description	Beneficiary	Due Date	Verification
MS 24	CFD models available (Preliminary models to be used for thermofluidics simulations implemented in the available software and ready to launch comparison with experimental results)	CERN	Jun 2016 	Agenda, attendance list on Indico
MS 77	Standard connectors available (Engineered design of a family of miniaturized connectors suited for both testing and final applications. Order for procurement submitted)	CERN	Mar 2018	Purchase order submitted
MS 82	Validated CFD models ready (Advanced models, based on subsequent improvements of the preliminary definition provided in MS24 , validated for use and ready for final phase of comparison with experimental results)	CERN	Apr 2018	Report to St Com

• T 9.2 Deliverables

Next deadlines coming

	Deliverable Description	Beneficiary	Due Date	Type
D 9.1	Station for tests on μ-channel test devices Fully engineered design of a test station available to partners, including detailed list of instruments and components, and manual of operation. One prototype test station built and in use for tests	CERN	Oct 2017	Other
D 9.2	μ-channel prototypes μ -channel cooling devices in Si-Si and Si-Glass available to the partners for execution of the agreed test programme, including final model validation. Specifications, geometries and features previously agreed by the partners	CSIC	Oct 2017	Demonstrator
D 9.3	Technology recommendations for μ-channel cooling Report detailing the state-of-the-art technologies selected for the production process of μ -channel cooling devices to be installed in future HEP experiments	CERN	Feb 2019	Report
D 9.4	Qualification and characterisation of μ-channel cooling Report detailing the standardized procedures endorsed to qualify and characterise μ -channel cooling devices to be installed in future HEP experiments	CNRS	Feb 2019	Report



• T 9.3 Milestones

	Milestone Description	Beneficiary	Due Date	Verification
MS 8	Advanced Mechanical Distributed facility requirements (Report outlining the range of measurement setups and their capabilities to be installed within the Advanced Mechanical Distributed Facility)	UOXF	Jan 2016 	Agenda, attendance list on Indico
MS 99	Advanced Mechanical Distributed facility ready (Report listing experimental setups within the Facility, and their performance as demonstrated with realistic prototypes)	UOXF	Feb 2019	Report to St Com

• T 9.3 Deliverables

	Deliverable Description	Beneficiary	Due Date	Type
D 9.5	Advanced Mechanical facility Definition of facility requirements: Identification of parameters characterizing the performance of support structures and identification of experimental techniques which make these parameters accessible, prioritization of the need by the international community for these measurements at a central facility	UOXF	Jun 2016 	Other
D 9.6	Common test structures Identification of test structure designs which allow discriminating measurements of relevant structural performance parameter, prediction of performance by FEA, production of test structures and benchmarking results of these structures with the facility	CSIC	Apr 2017 	Other
D 9.7	Standard procedures for qualification and characterisation Setup of measurement facilities, operation of the facility, evaluation of measurement hardware and procedures, development of definition of standard measurement procedures at the Advanced Mechanical facility	UOXF	Feb 2019	Report

Report in preparation