Status of the FFD

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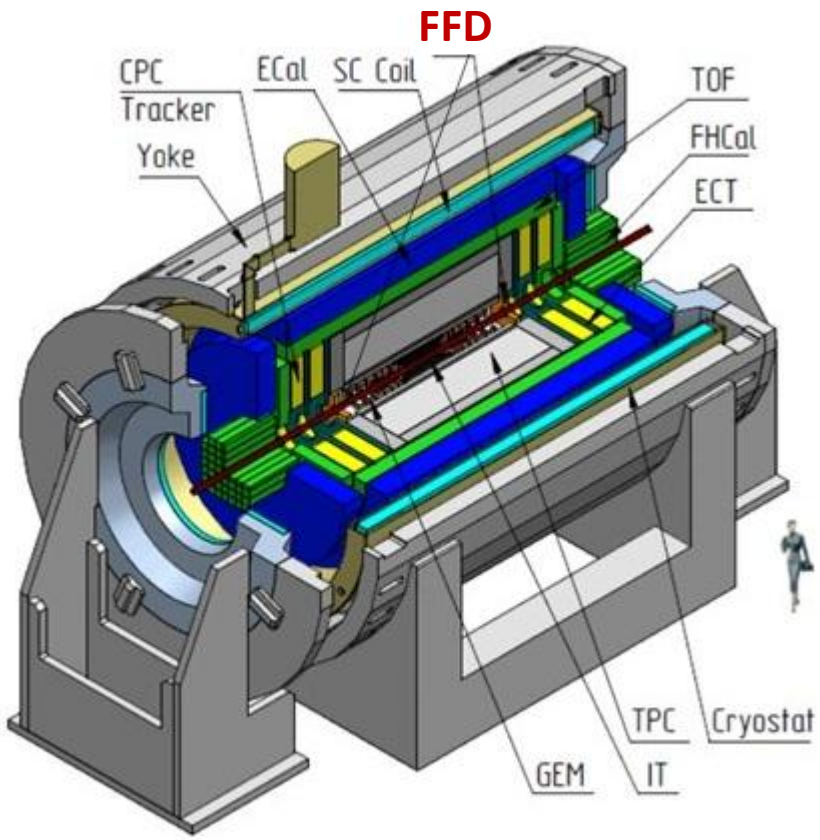
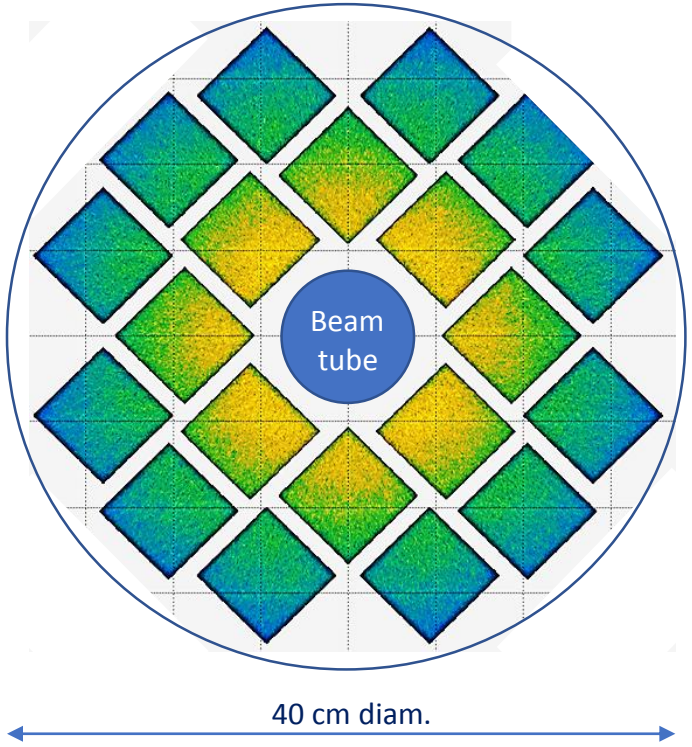
Fast Forward Detector (FFD)

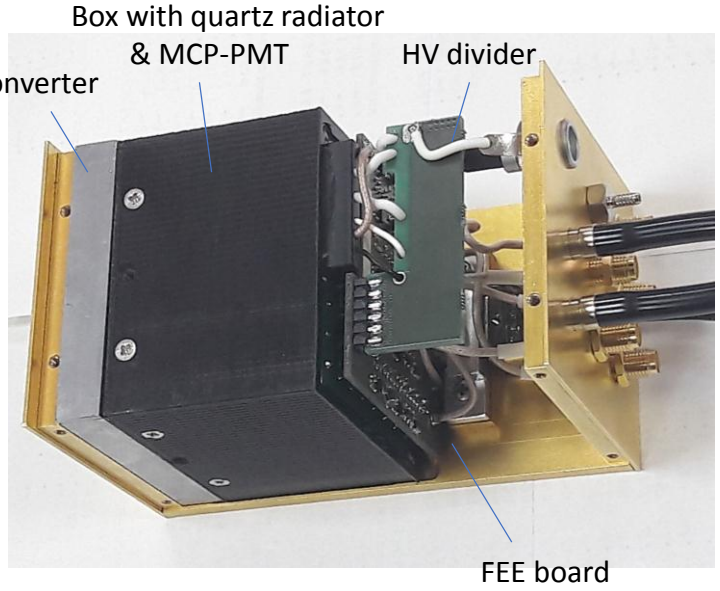
Two Cherenkov detectors FFD_E and FFD_W
20 modules & 80 cells / channels
L = 140 cm from MPD center



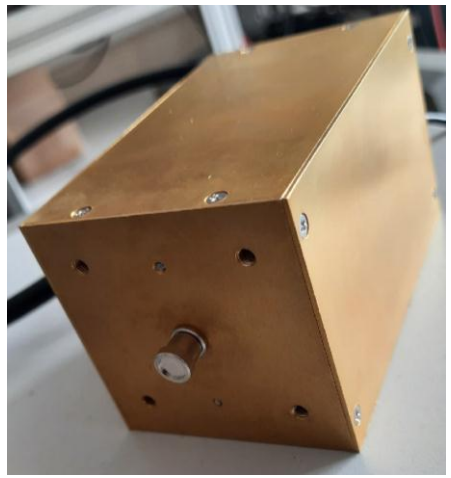


Distribution of incoming particles on the front of FFD modules

FFD modules



FFD module

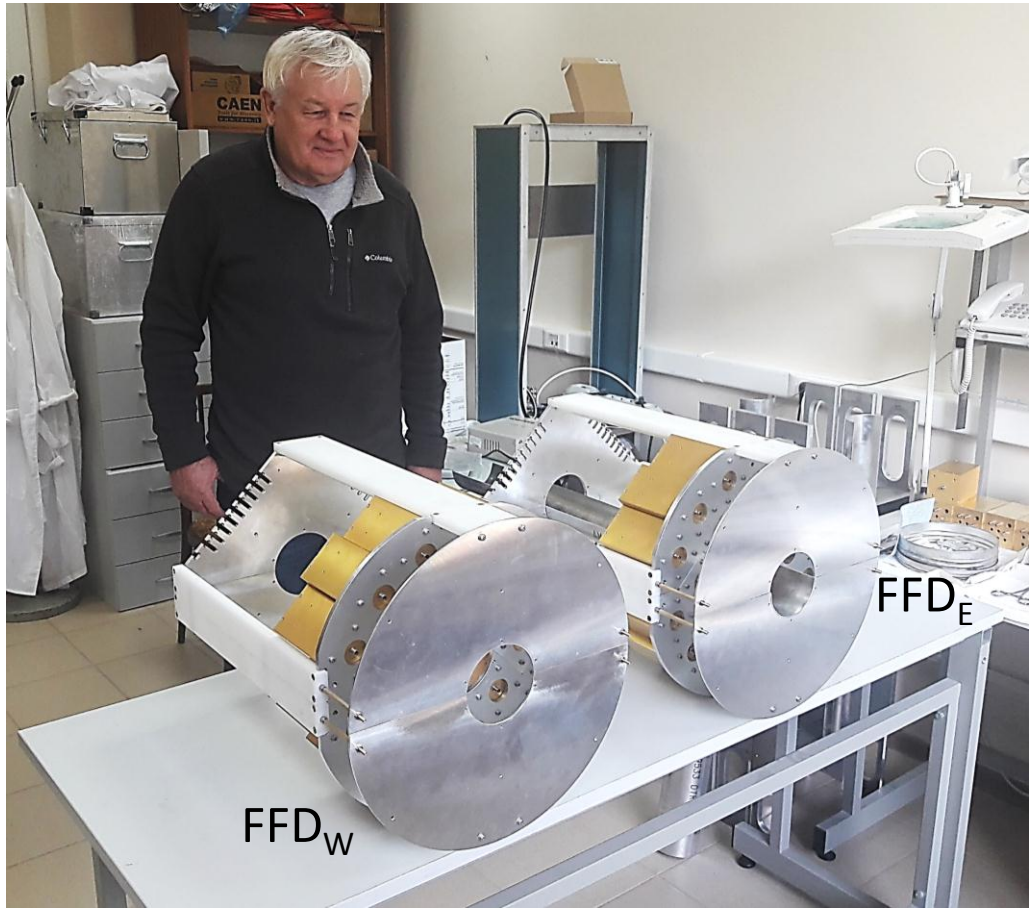


2021 - stage of production and testing of FFD modules for both sub-detectors was successfully finished

Test measurements with a pair of first modules were done using full chain of cables and electronics, both with TDC and CAEN digitizers. The time resolution of FFD channels: σ_t = 30 – 40 ps.

Long-term tests with cosmic muons with groups of the modules and sub-detectors are planned to begin in Summer 2022

FFD Mechanics

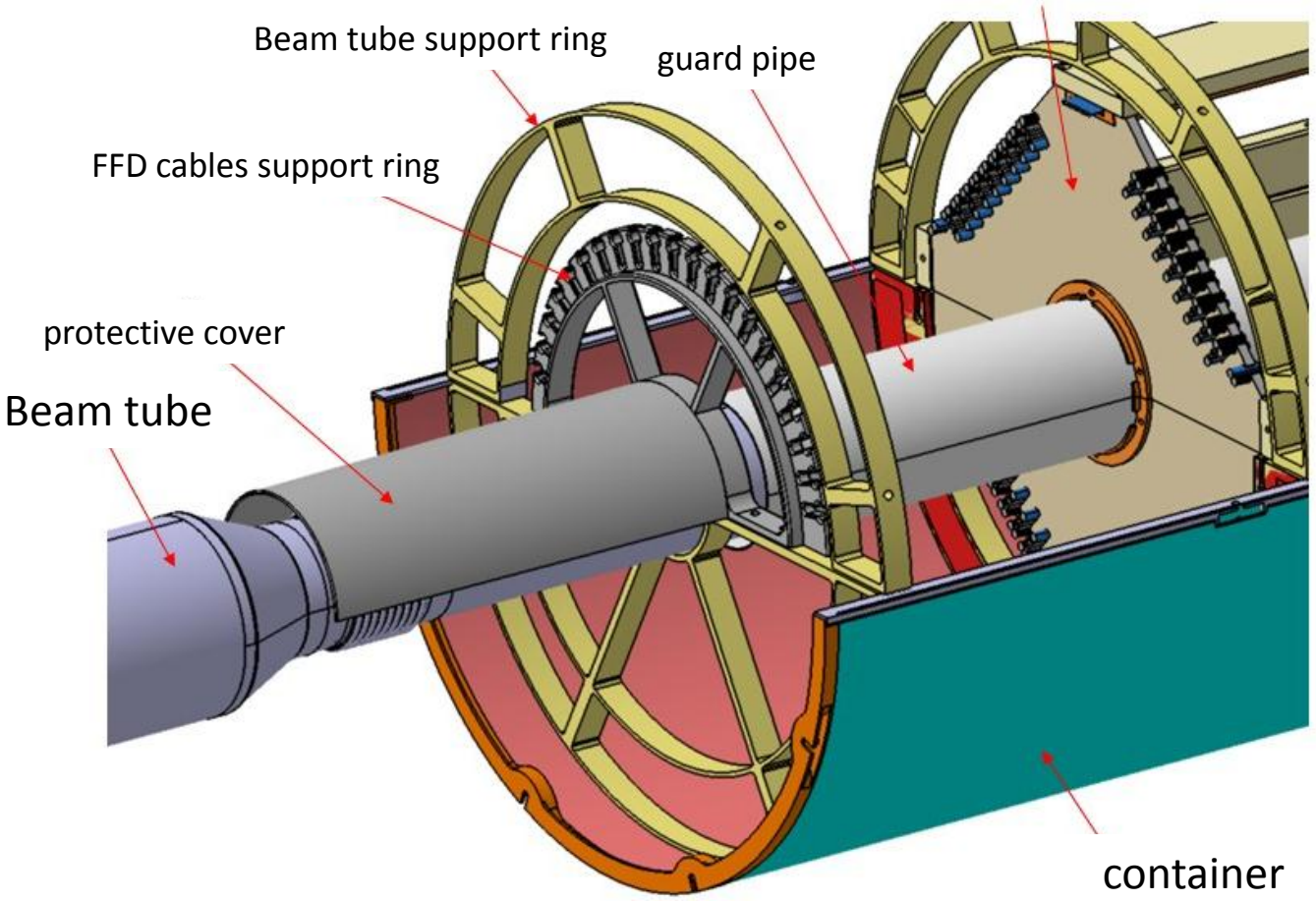


Assembly of FFD mechanics in laboratory (Oct. 2020)

Tools for FFD installation

Current status: almost ready, final adjustments are being made to facilitate installation of the sub-detectors in MPD

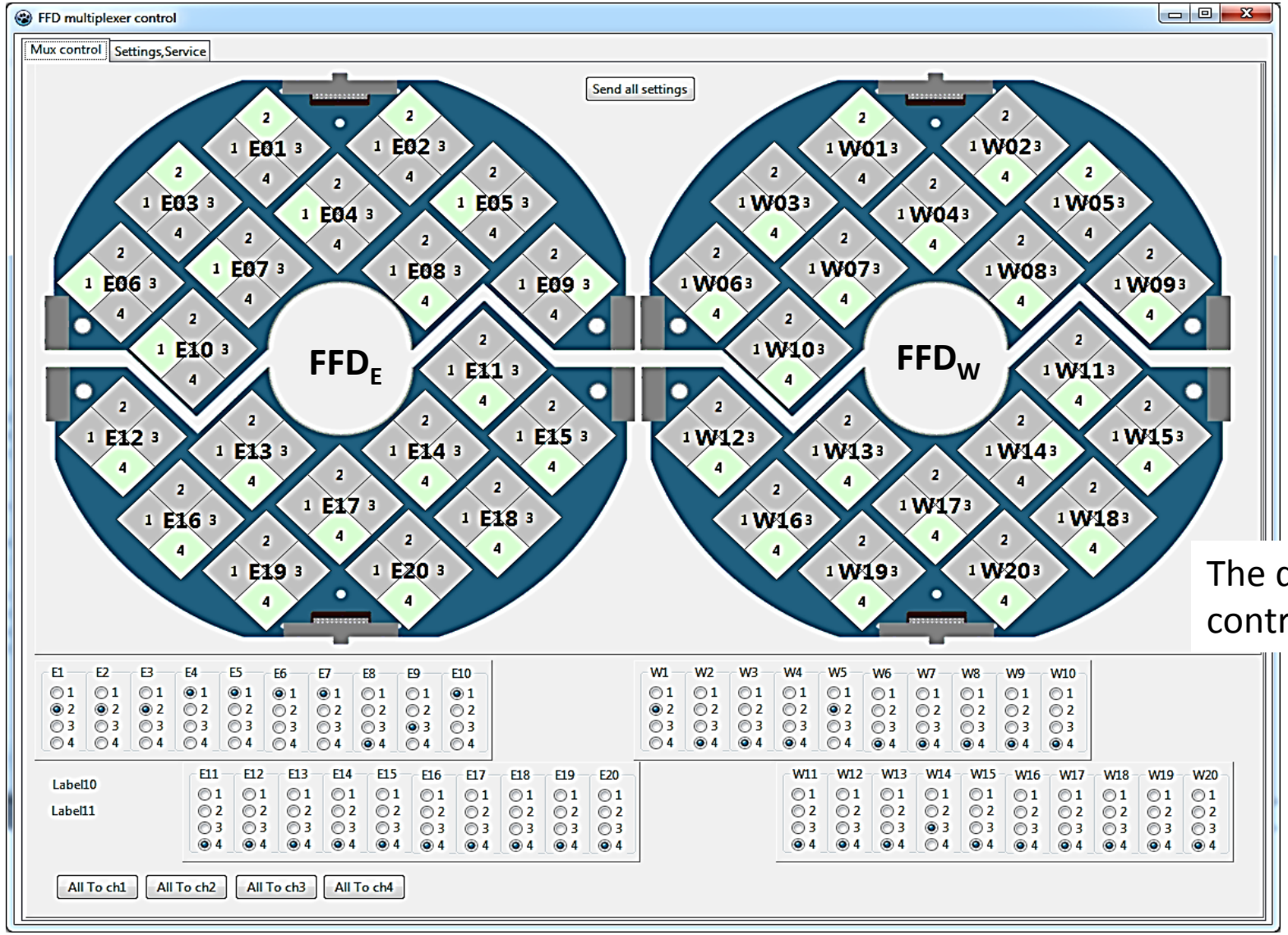
FFD Mechanics



Design of FFD cable support

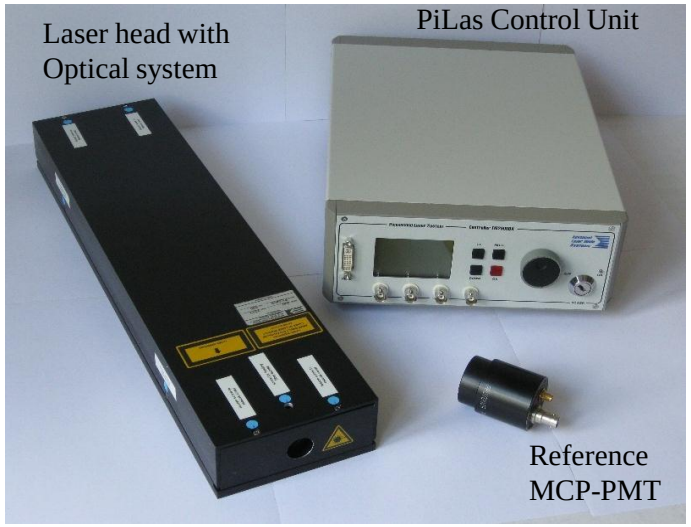
FFD cables support ring and protective cover made with 3D printer

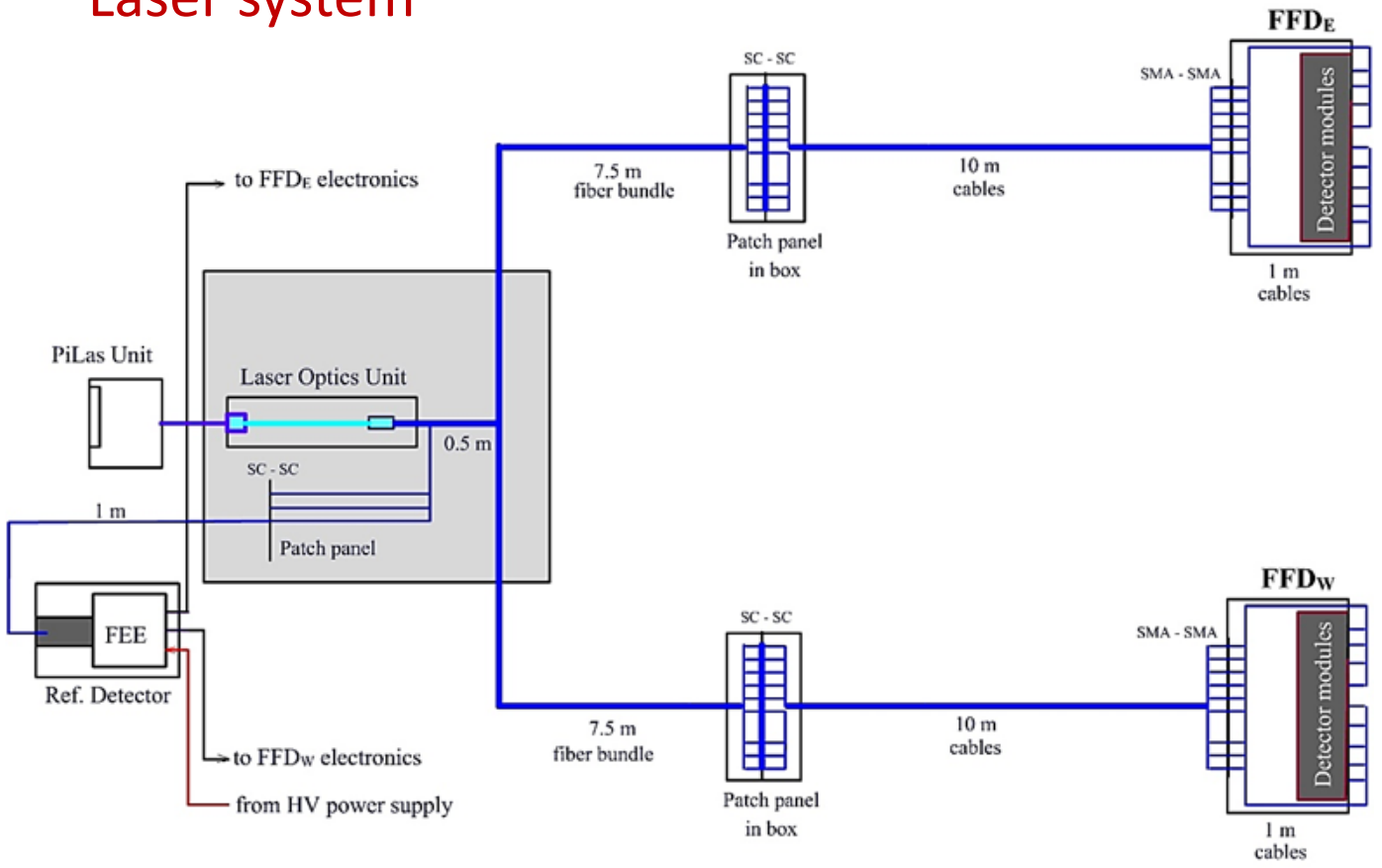
FFD interface panel

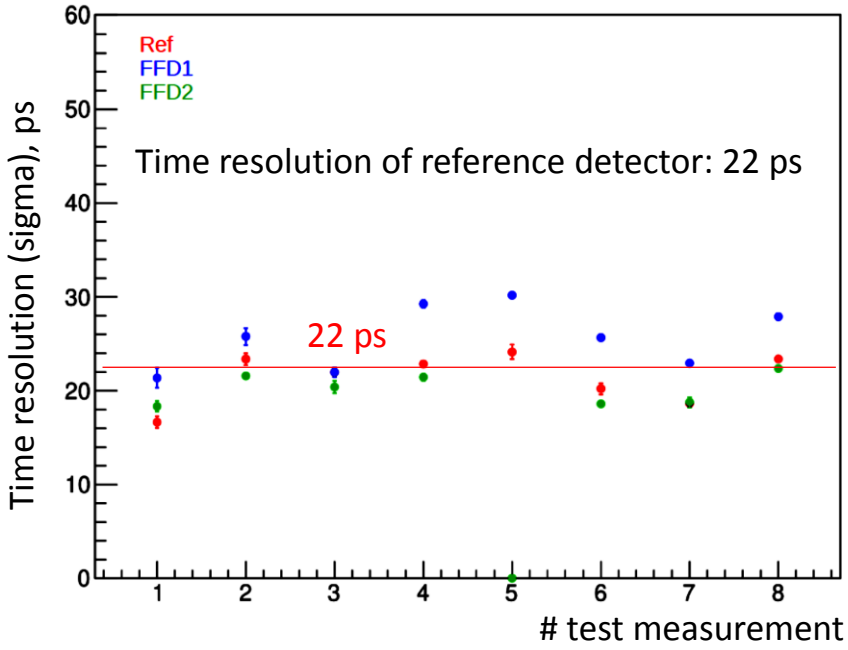


The designed interface is used for control of FFD regime and operation

Laser system







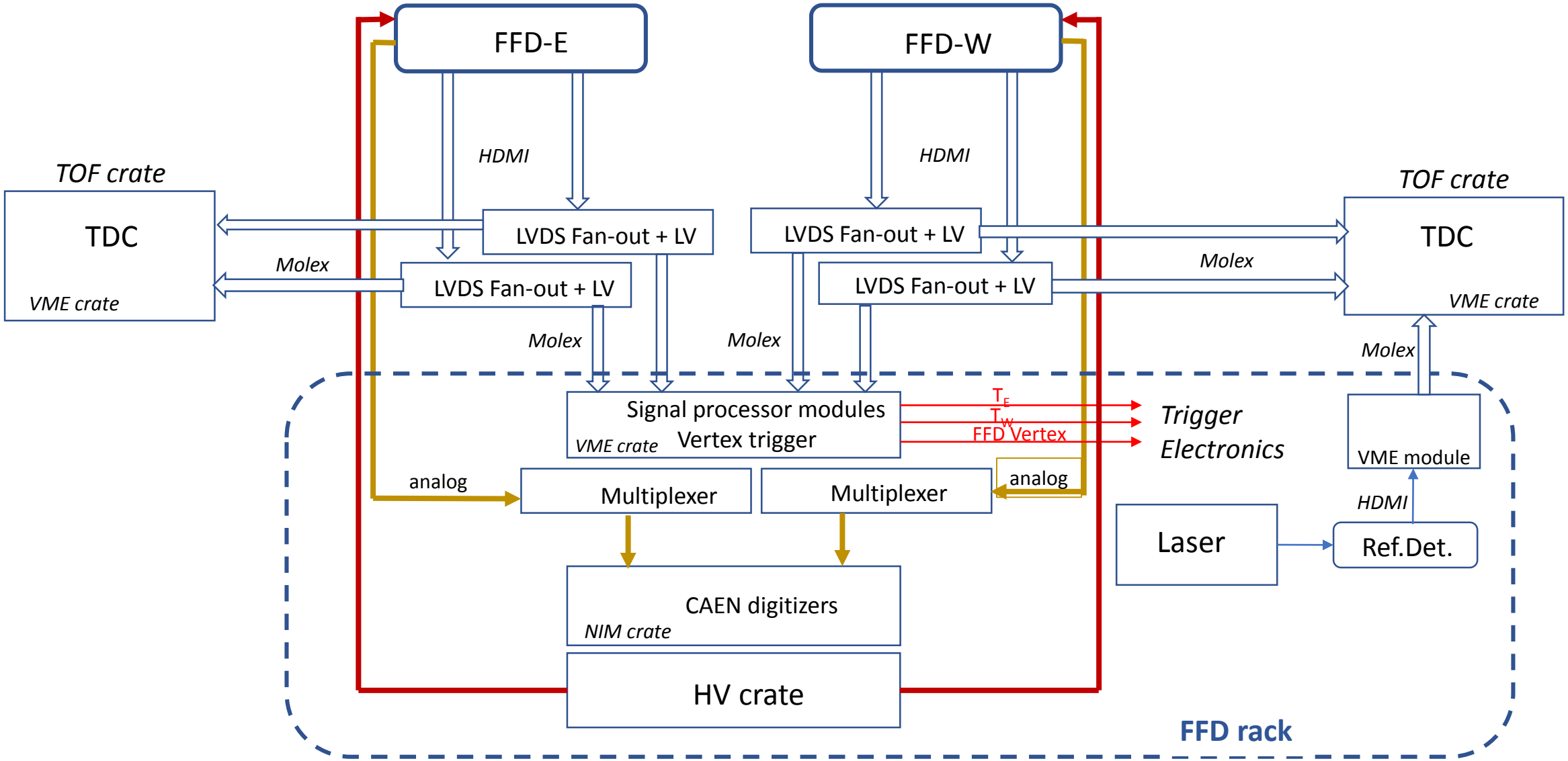
Status:

all components are available, checked and being used for testing modules and electronics

Study of FFD operation

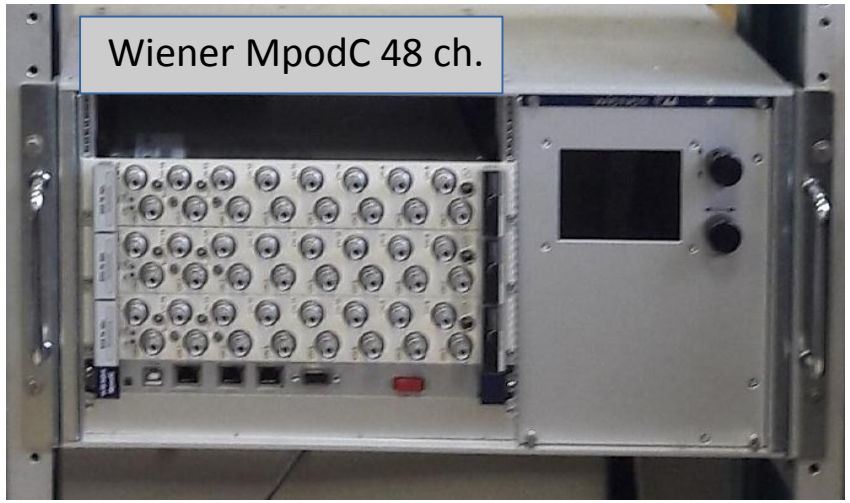
The stand with four scintillation planes is used for test measurements with cosmic muons for study of FFD performance since 2021

Current concept of FFD electronics

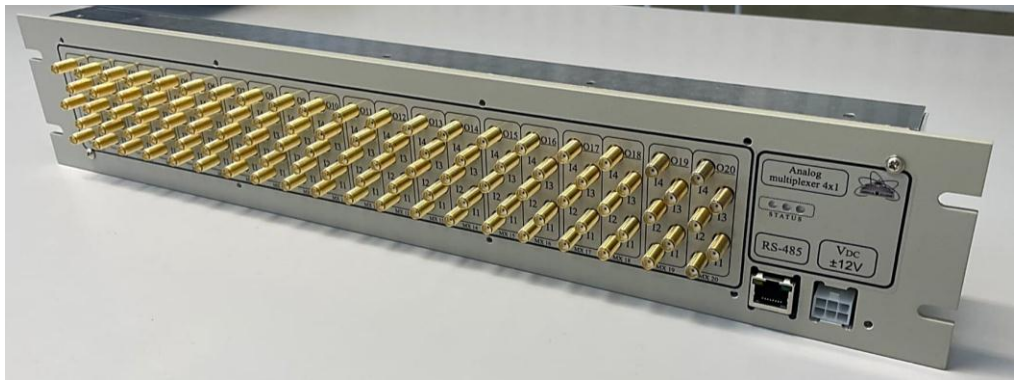


Status of Electronics

HV power supply system is ready for operation



Multiplexer modules are produced and tested

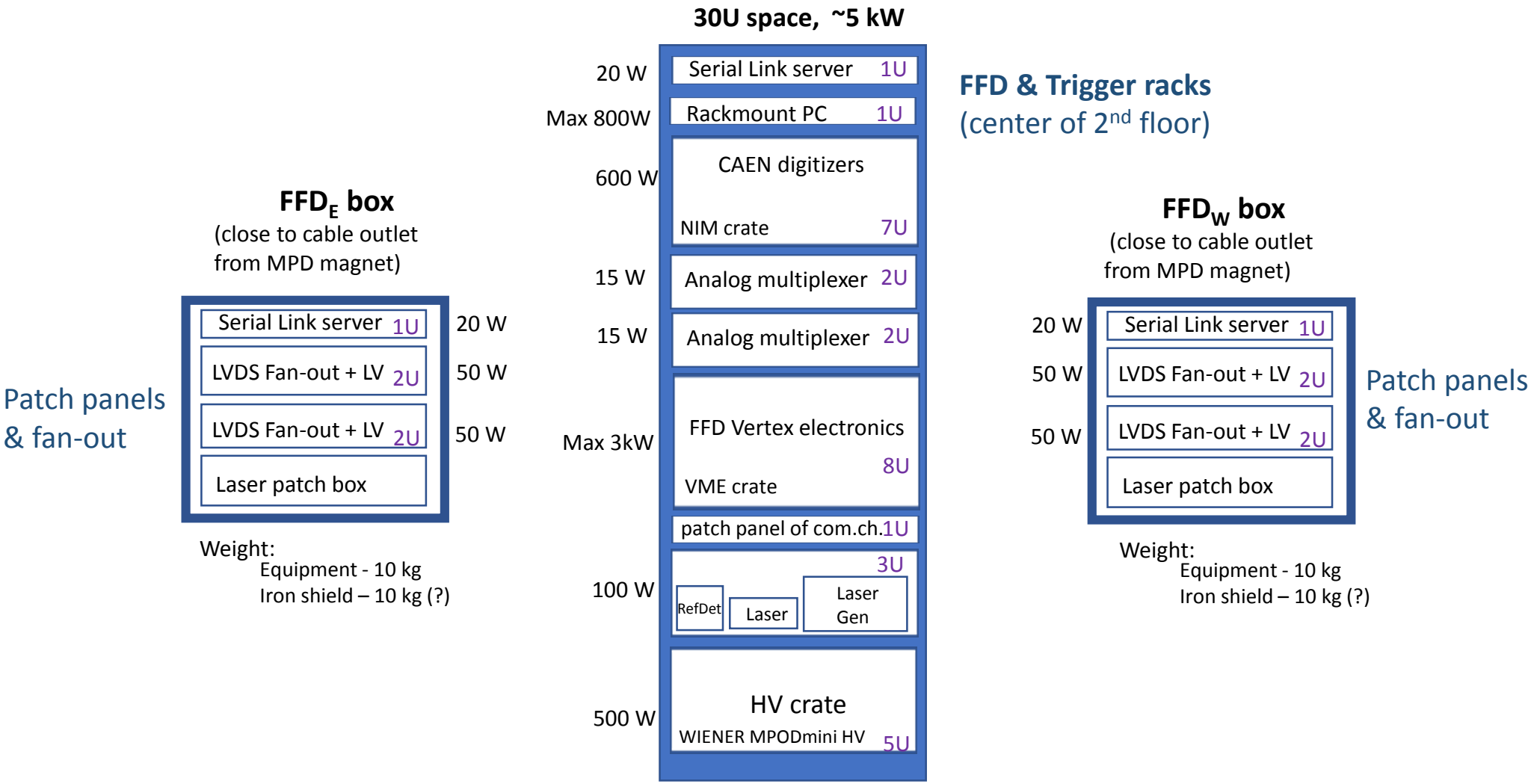


FFD operation control system

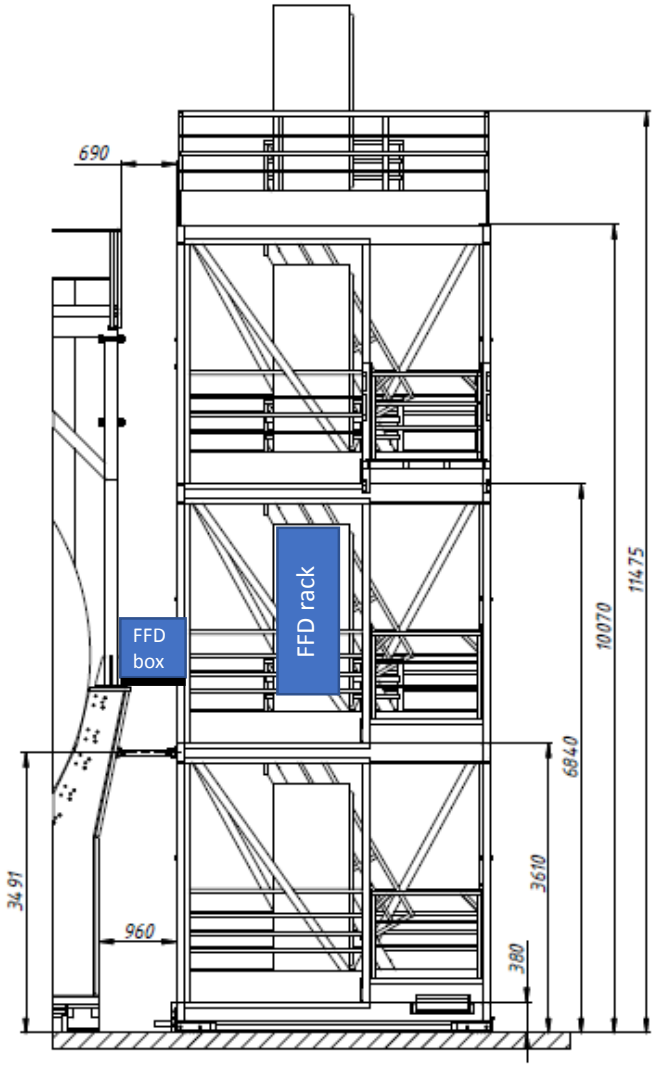
Modules:

LVDS Fan-out Signal processor modules Vertex trigger	have to be redesigned and produced in 2022 according to new concept of FFD electronics

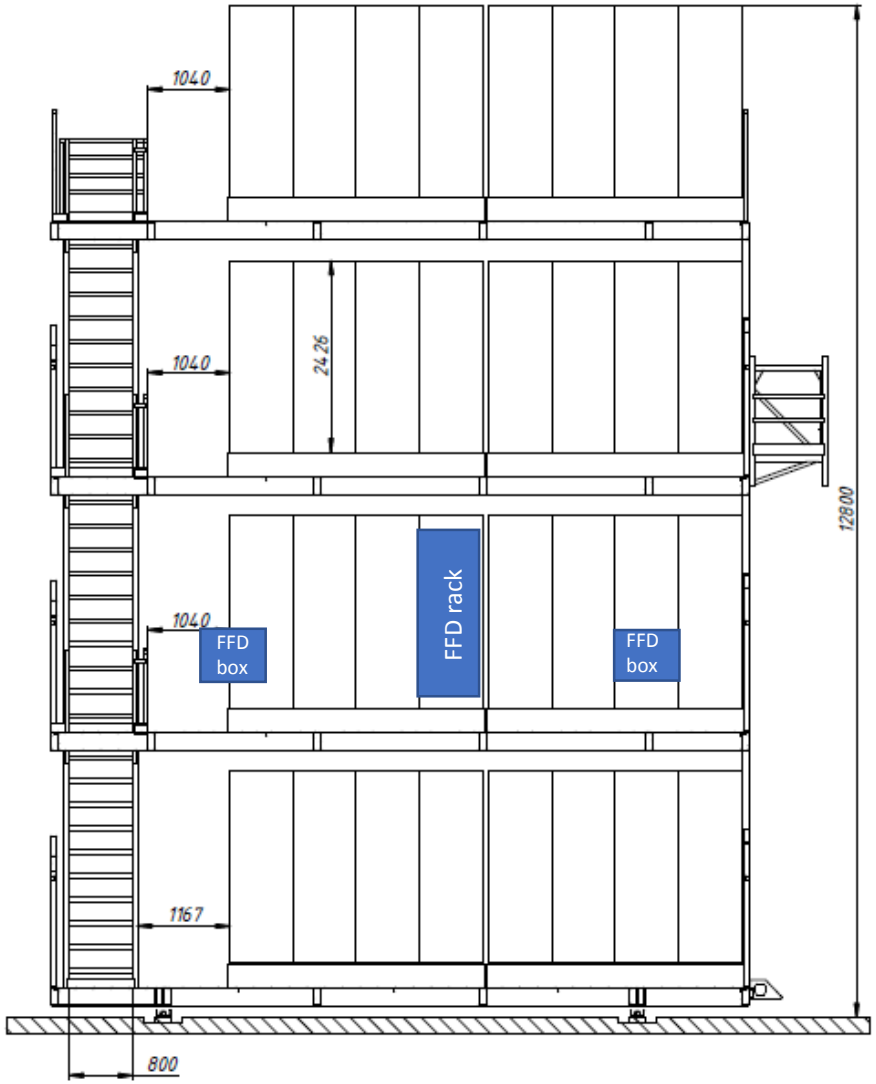
Current concept of FFD electronics position on MPD platform



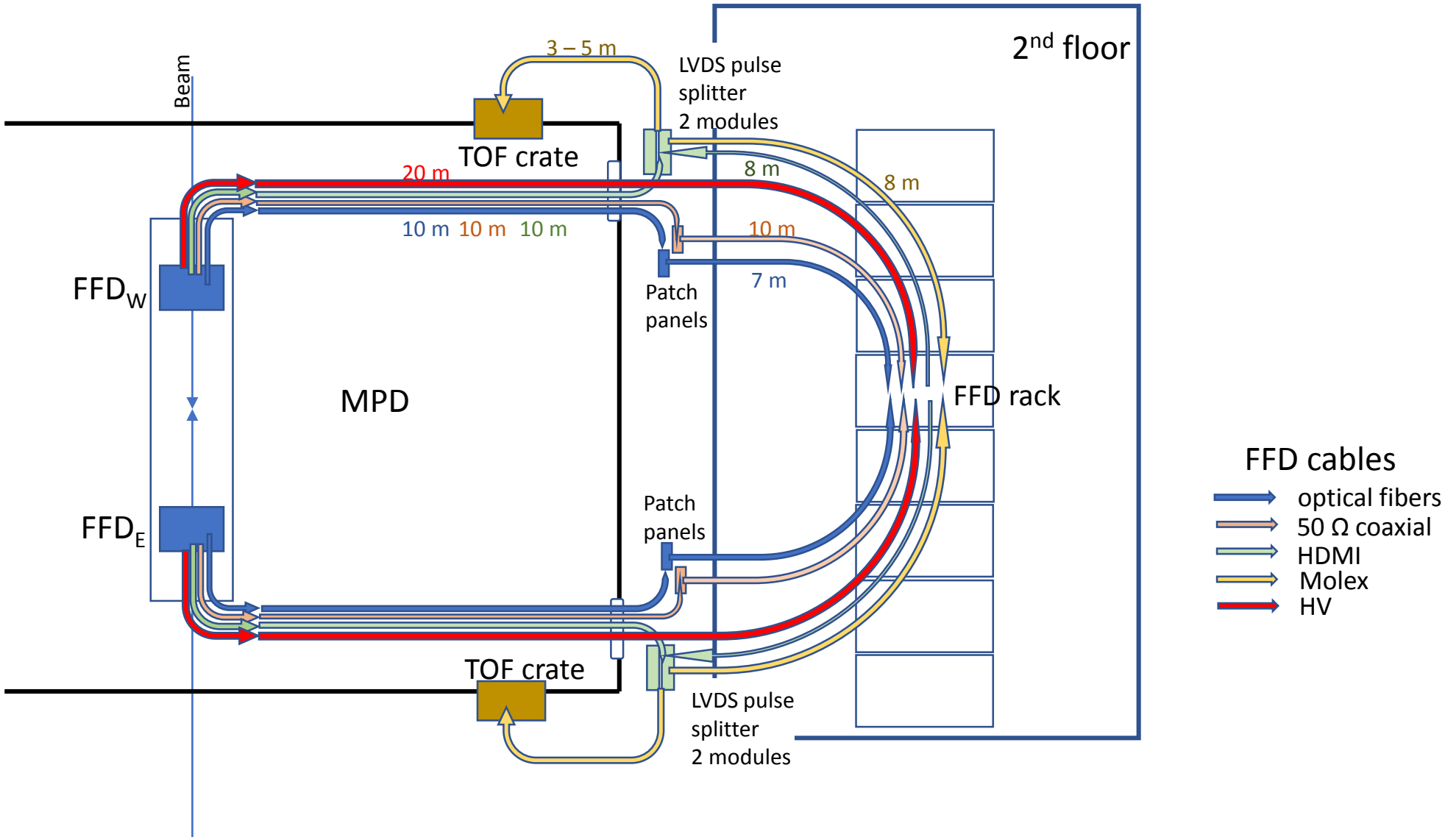
Current concept of FFD electronics position on MPD platform



2nd floor



FFD cable lines



Status of cables

There are 2 branches of cables for 2 sub-detectors

Requirements:
Signal cables must be with minimal length
HDMI < 10 m
coaxial < 10 m

#	Type *	Length (m)	Number	from	to	Status
1	HDMI	1.0 + 10	22 + 22	Detector	FFD box	Available
2	Coaxial	1.5 + 10	105 + 105	Detector	FFD box	Available
3	Optical	1.5 + 10	26 + 26	Detector	FFD box	Available
4	Optical fiber bundle	7.5	1 + 1	Laser	FFD box	Available
5	HV	1.5 + 20	22 + 22	Detector	FFD rack	Available
7	Molex	3 - 5	5 + 5	FFD box	TOF crate	Available (from TOF group)
8	Molex	8 - 9	5 + 5	FFD box	FFD rack	Available (from TOF group)
9	HDMI	10	1 + 1	FFD rack	FFD box	Available
10	Coaxial	10	105 + 105	FFD box	FFD rack	Have to be purchased in 2022

FFD Timetable 2022

Sub-system	2022			
	Jan -March	Apr - June	July - Sep	Oct - Dec
FFD sub-detectors			Test measurements	
FFD electronics	Production and testing			
Vertex & L0- trigger electronics			Production and testing	
Local readout system	Testing			
HV system	Available			
Laser system	Available			
Cable system	Mostly available, production of coaxial cables			
Detector Control System	Design, production and testing			
FFD sub-detector mechanics	Mostly available, finalization			
Study of FFD operation in lab.			Tests with cosmic rays and laser	
Installation tools	Mostly available, finalization			

Summary

- ✓ Up to now, there are no problems with FFD preparation for installation in Dec. 2022.
- ✓ Main efforts in 2022 are devoted to design and production of FFD electronics and test measurements with two sub-detectors FFD_E and FFD_W.
- ✓ Mainly all components and materials needed for realization of the FFD project are available besides some coaxial cables that we plan to purchase in 2022.