



# Status of Fast Forward Detector (FFD)

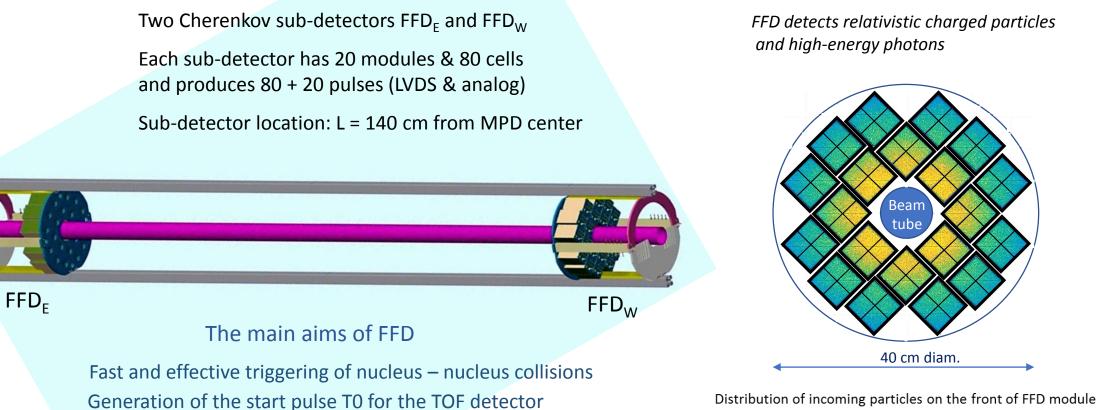
**Vladimir Yurevich** 

LHEP / JINR

XIII Collaboration Meeting of the MPD Experiment at the NICA Facility

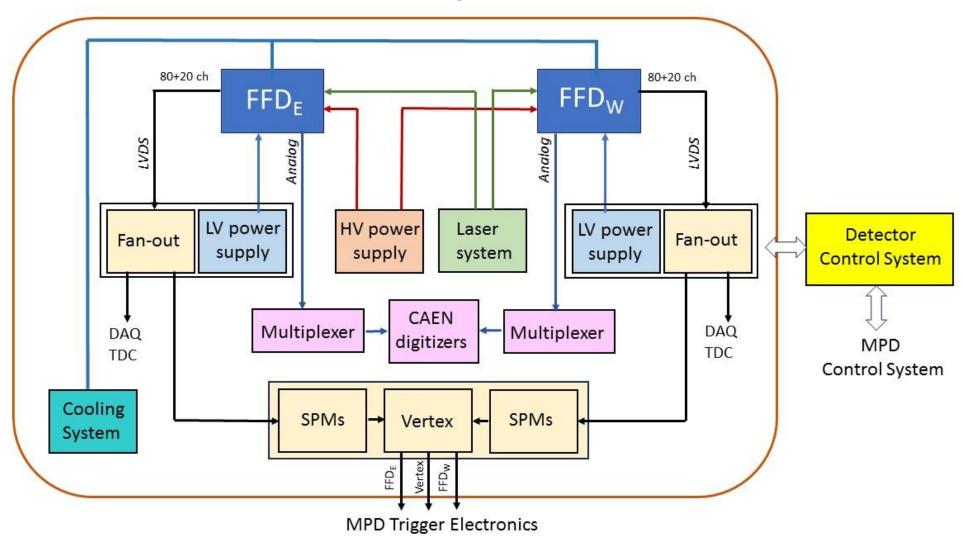
Dubna, April 23-25, 2024

# Fast Forward Detector Design

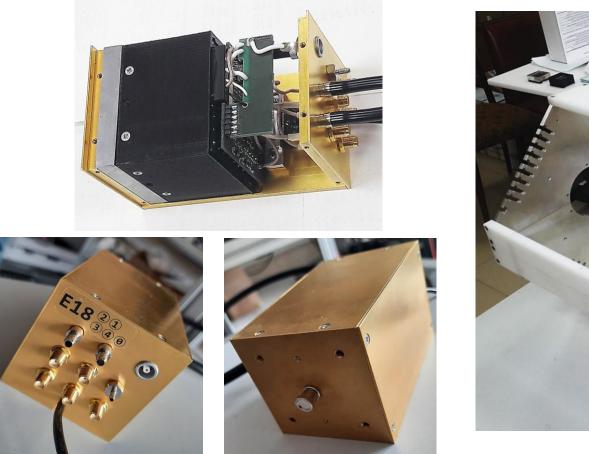


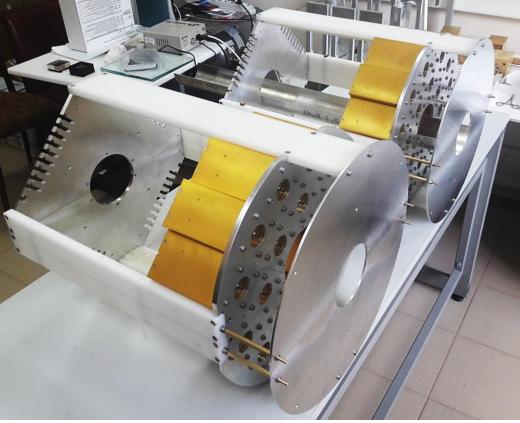
Distribution of incoming particles on the front of FFD modules

# FFD Sub-Systems



# FFD modules and sub-detector mechanics





FFD sub-detector mechanics

FFD modules

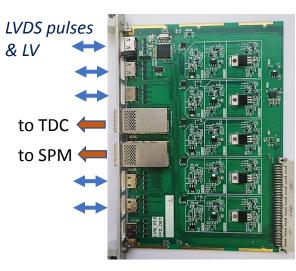
Readiness 100%

#### Electronics for LVDS pulses & LV

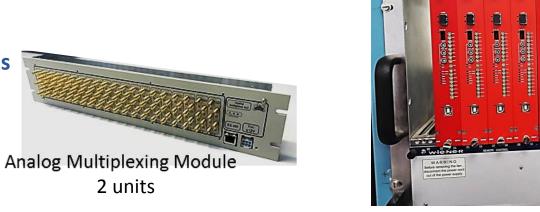
Readiness 100%



Crates with Fan-out & LV modules



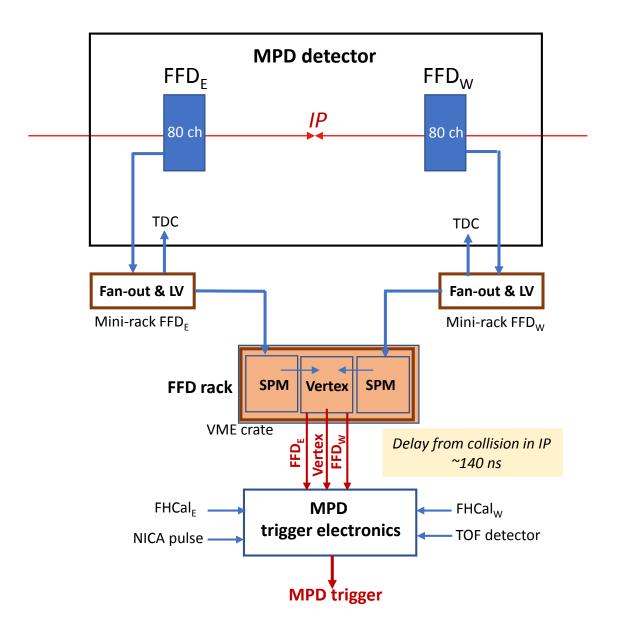
Fan-out & L V Module

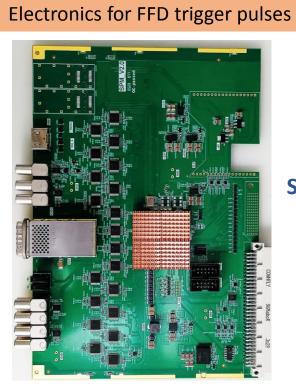


Electronics for analog pulses Readiness 100%

NIM crate with CAEN digitizers

# FFD in MPD Trigger





SPM module

2 units are ready6 units will be produced with delay of ~ a few months

Vertex module is under development (Dec. 2024)

## High Voltage System

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## Cable System



Readiness 100%

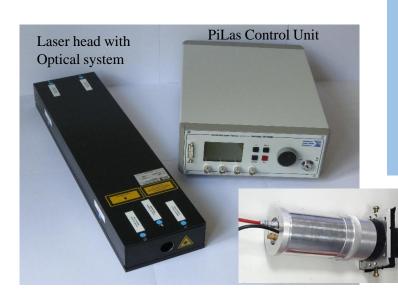
All set of FFD cables is available and it was tested

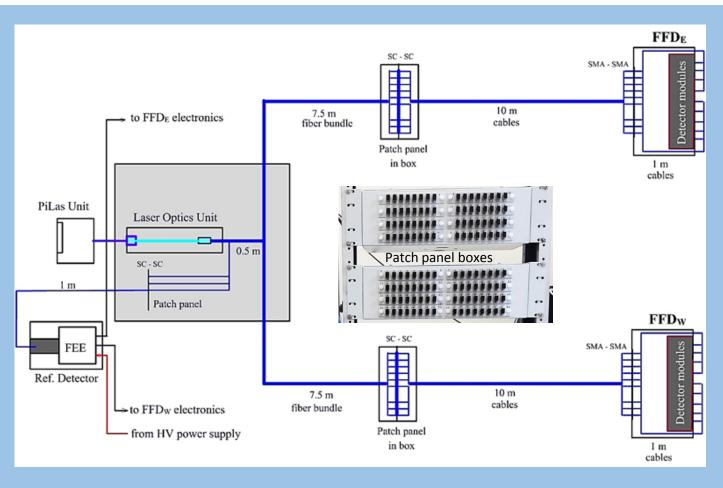
- HV cables
- HDMI cables
- Molex cables
- Coaxial cables
- Optical cables

## Laser System

#### Laser system components

- PiLas laser
- Laser Optics Unit
- Reference Detector with <30 ps time resolution</li>
- Fiber bundles 7.5 m (2 x 60 fibers)
- Patch panels
- Set of optical cables 10 m (2 x 20 pcs.) 1.5 m (2 x 20 pcs.)

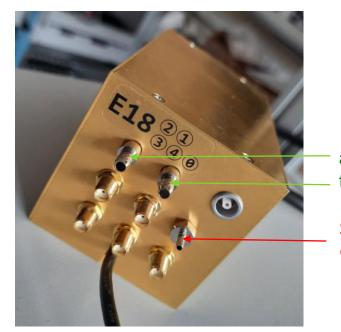




Reference detector With MCP-PMT

#### Readiness 100%

#### Cooling and temperature control system



Power consumption per module is 1 W or 20 W per FFD sub-detector Air flow through the modules removes ~1/2 thermal energy

air flow feedthrough

Sensor connector

**Requirement for FFD cooling:** 

Flow of cool and dry air or nitrogen with 100 L/min per subdetector

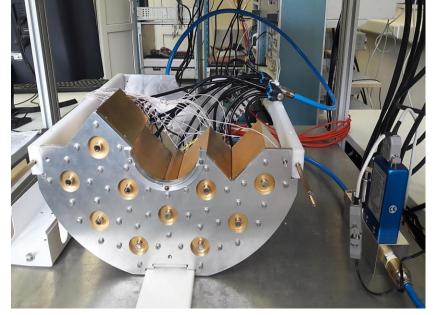


Cables and distributors of air flow to FFD modules



Temperature Monitoring Module (2 per Sub-Detector) **Current status:** All components are available

Readiness 100%

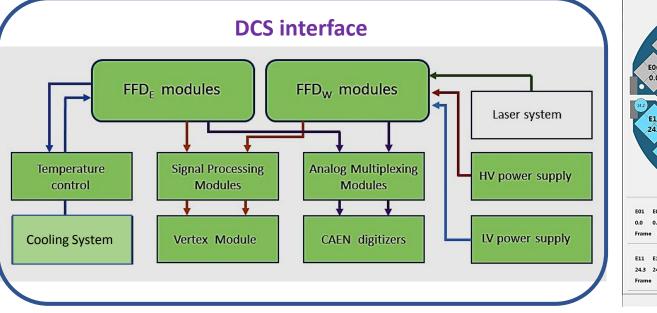


Test of cooling system with air flow

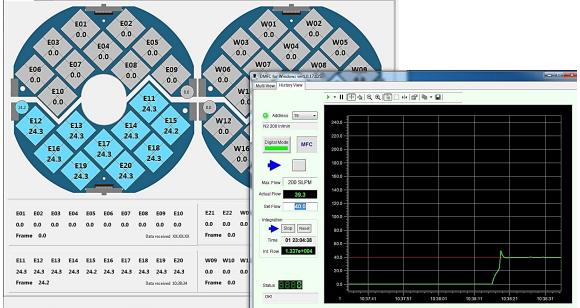
# **Detector Control System**

The system is built using client-server architecture and it includes control and monitoring of all FFD subsystems

#### Example



#### Interface of temperature monitoring



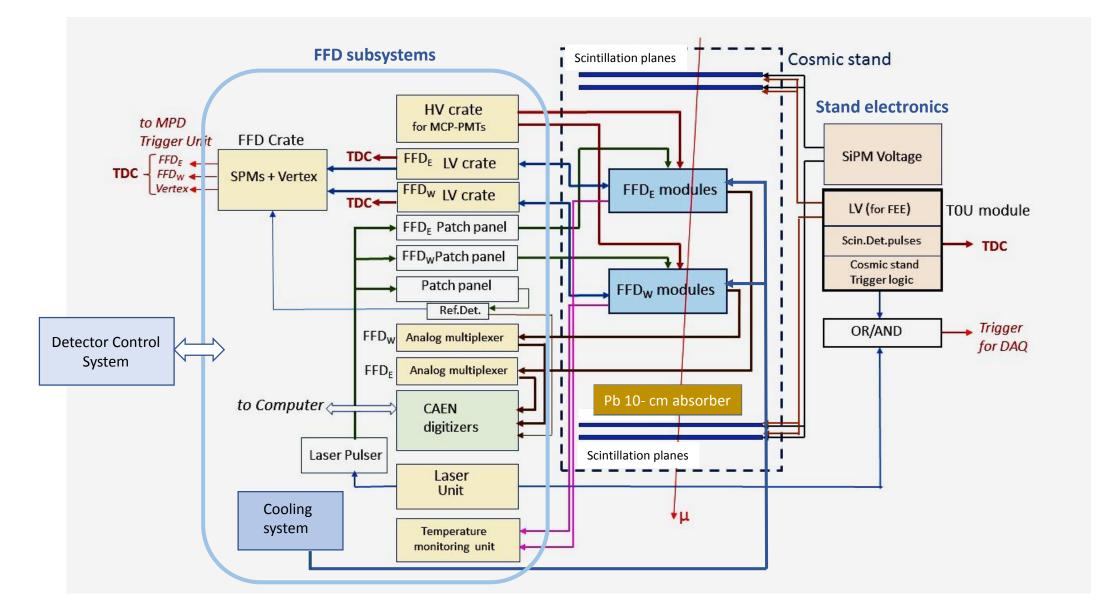
#### States of equipment:

- "OFF" not in operation (switched off)
  - | "StdBy" in Stand-by mode
  - "Ready" in operation (on)
  - "Wrng" warning something is out of operation range
  - "ALRM" alarm dangerous regime
  - (must be switched off and repaired)

Monitoring and control of the cooling system with air flow

#### Readiness 80%

#### A scheme of the Stand for Test Measurements with Cosmic Muons & Laser



#### The stand for study of FFD operation with cosmic rays and laser

Preparation to a final global test reproducing as much as possible FFD operation in MPD.

The aim - to get proper and stable work of all FFD subsystems.

Period of the tests: June – Dec. 2024



# Summary

Subsystem	Readiness	Comment	Expected delay
Sub-detectors	100%	-	
Electronics	75%	Delay with production of SPM & Vertex modules	~a few months
HV & LV systems	100%	-	
Laser system	100%	-	
Cooling system	100%*	-	
DCS & Interface	80%	In progress	~6 months
Cable system	100%	-	
Long term test with cosmic rays & laser	In beginning	In progress	Tests till Dec. 2024

\* A source of compressed air flow is required

# Thank You for Your Attention!