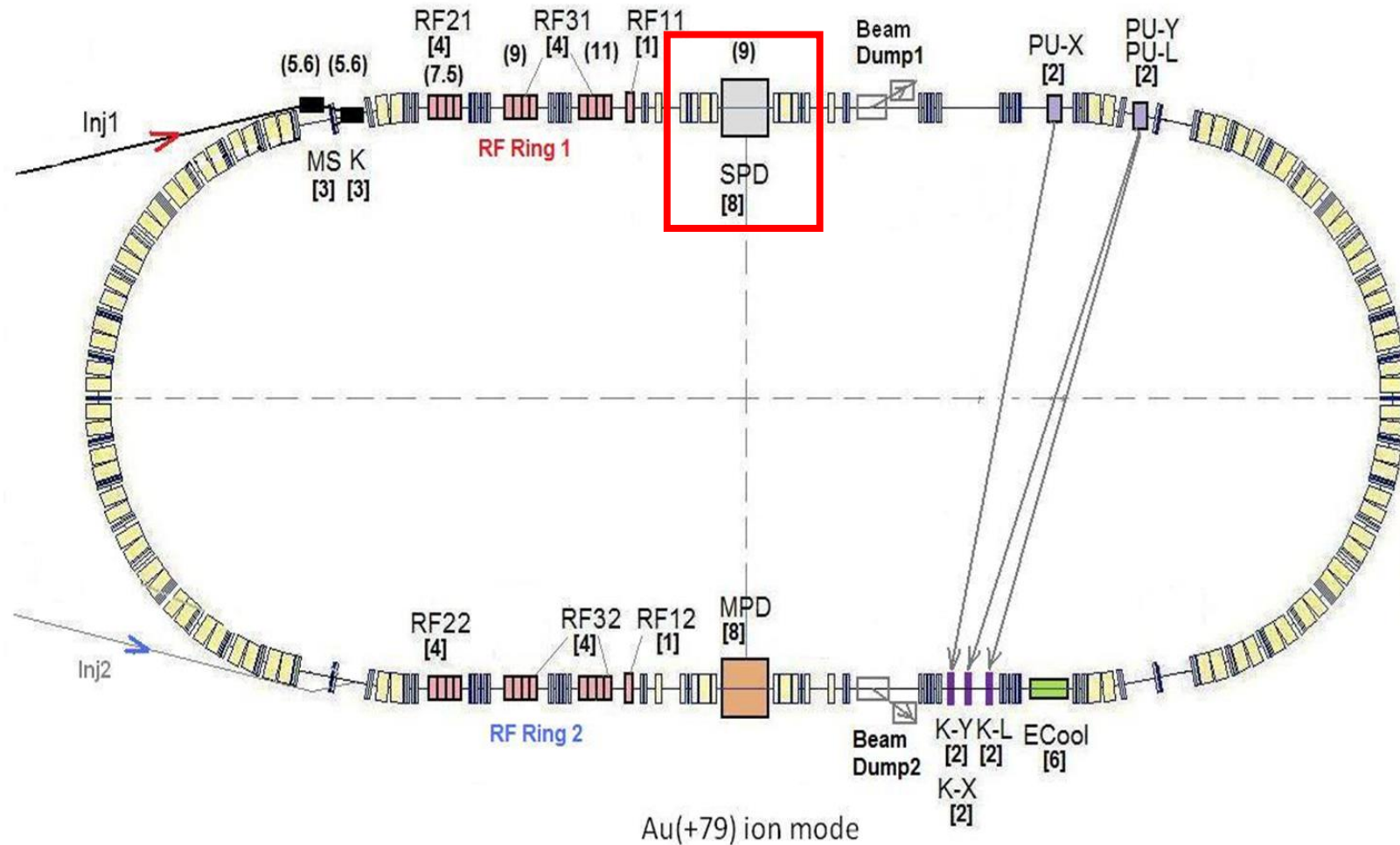




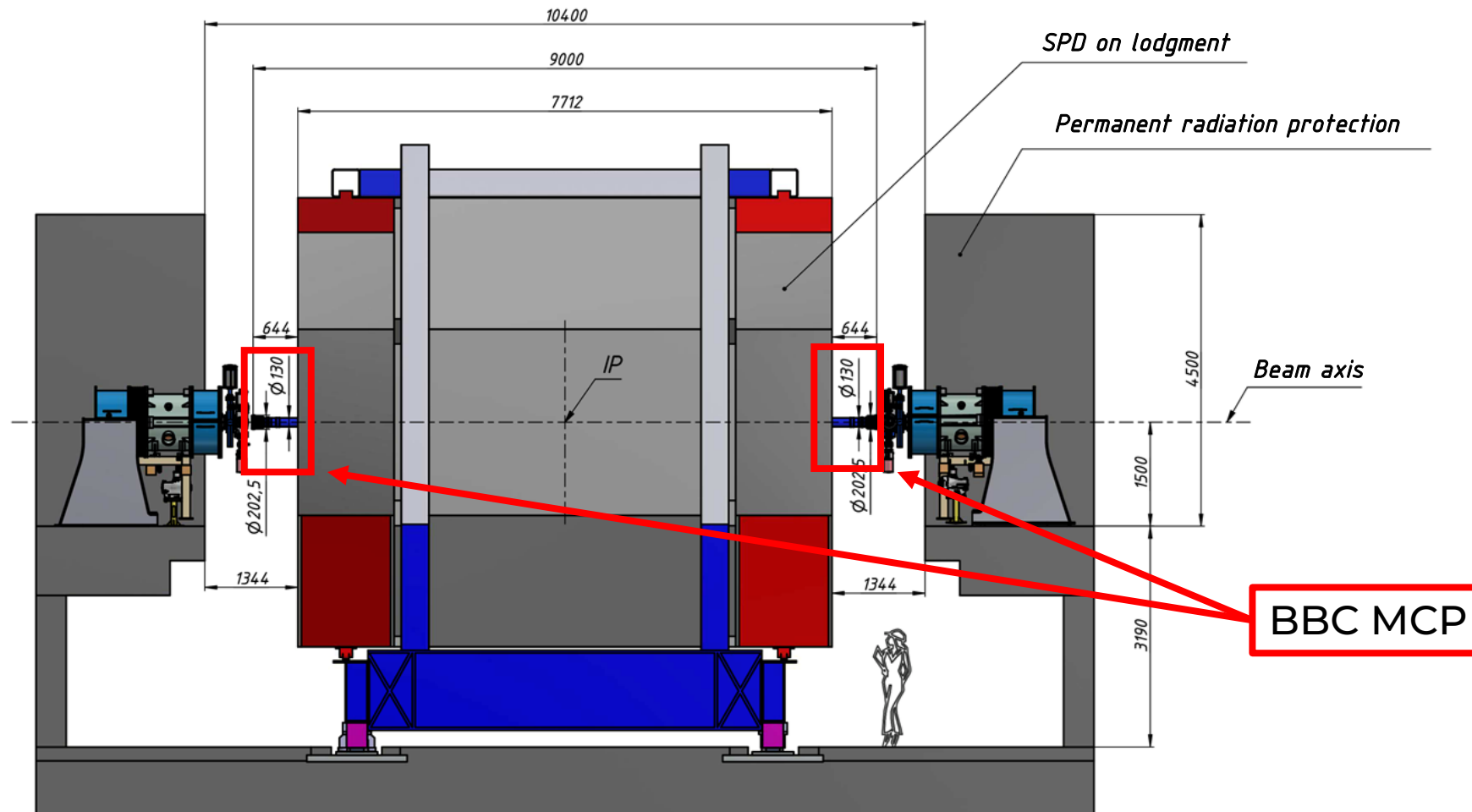
# BBC MCP Detector in the SPD experiment

Speaker – Safonov Andrey

# SPD detector at NICA

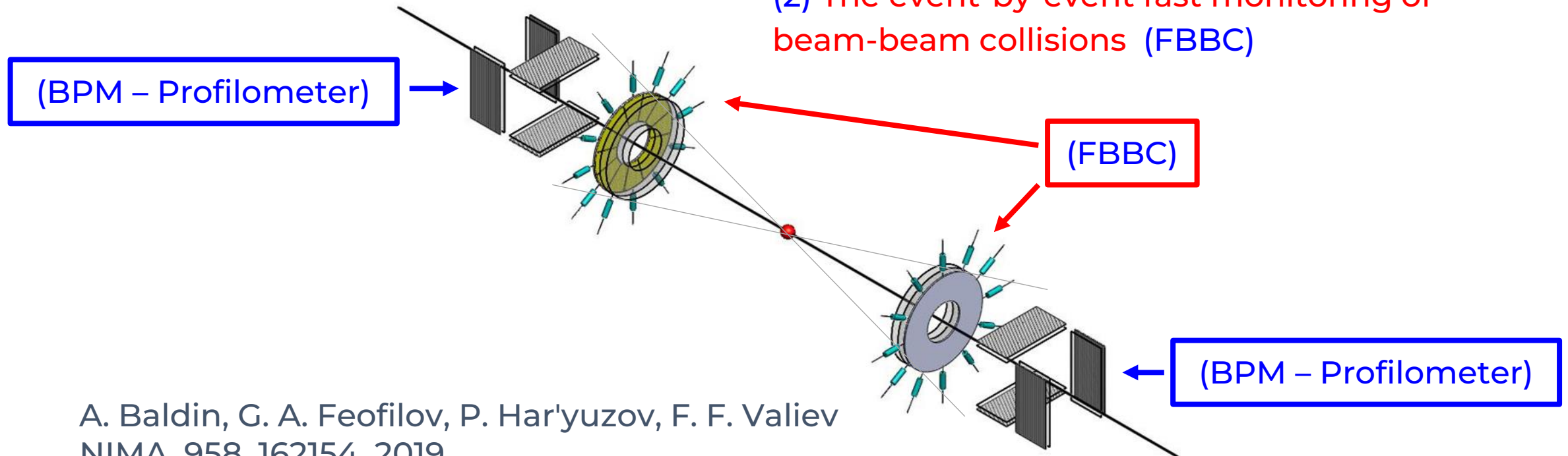


# Detector BBC MCP at SPD



# Fast BBC monitor for experiments at NICA

- (1) Fast monitoring of the beam position and profile (BPM - Profilometer)
- (2) The event-by-event fast monitoring of beam-beam collisions (FBBC)



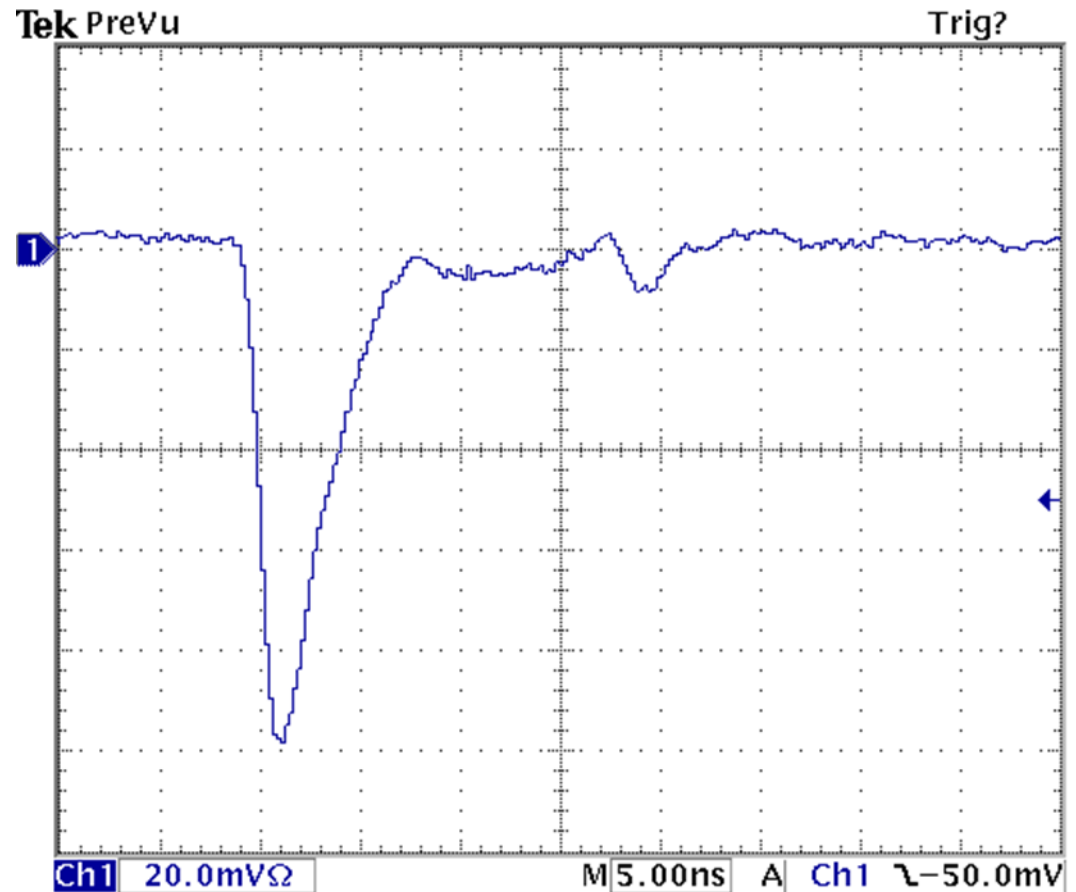
A. Baldin, G. A. Feofilov, P. Har'yuzov, F. F. Valiev  
NIMA, 958, 162154, 2019  
Reported at the VCI2019  
DOI:10.1016/j.nima.2019.04.108..



# Arguments for MCP

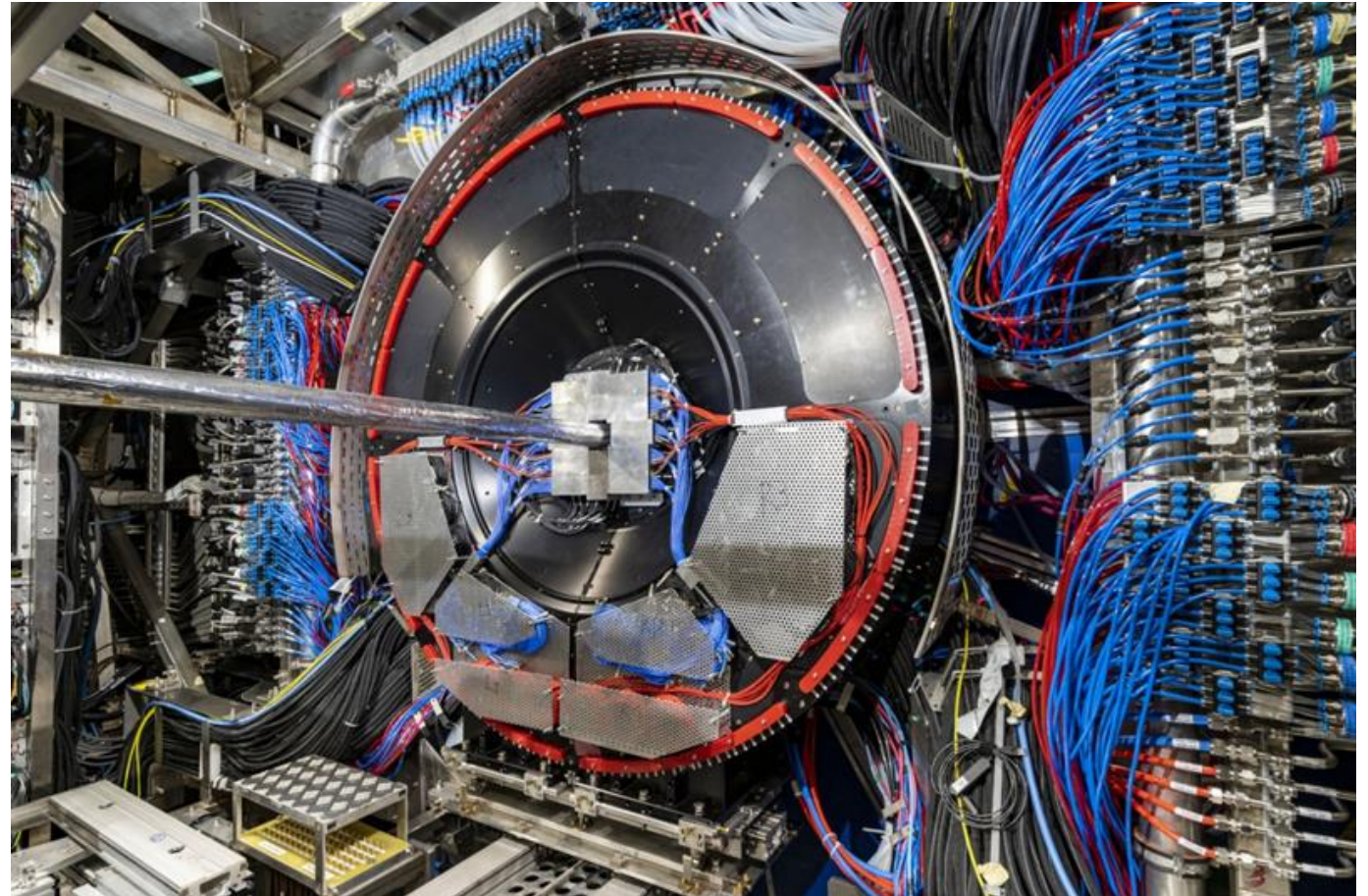
MCP features:

- short width of signal
- steep leading edge
- radiation stability



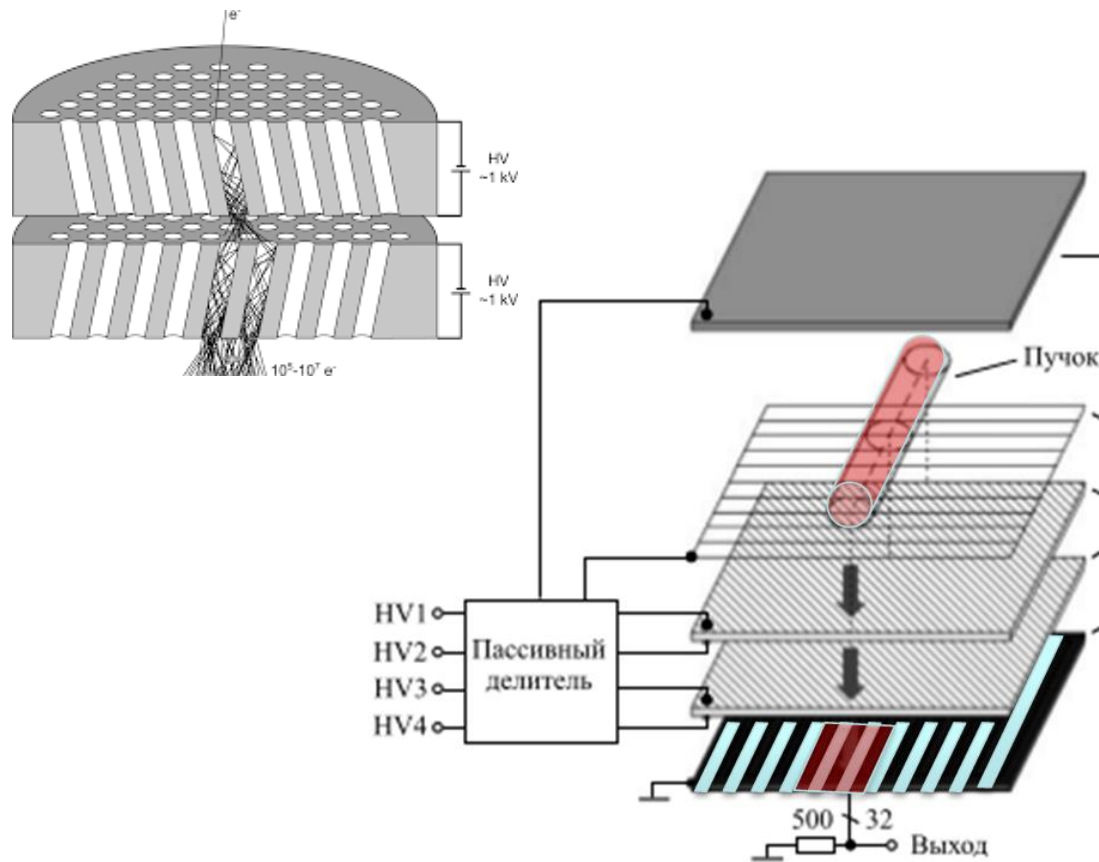
# The new ALICE Fast Interaction Trigger

Wladyslaw H. Trzaska  
(Project Leader of  
ALICE FIT detector)  
23rd Sep 2021



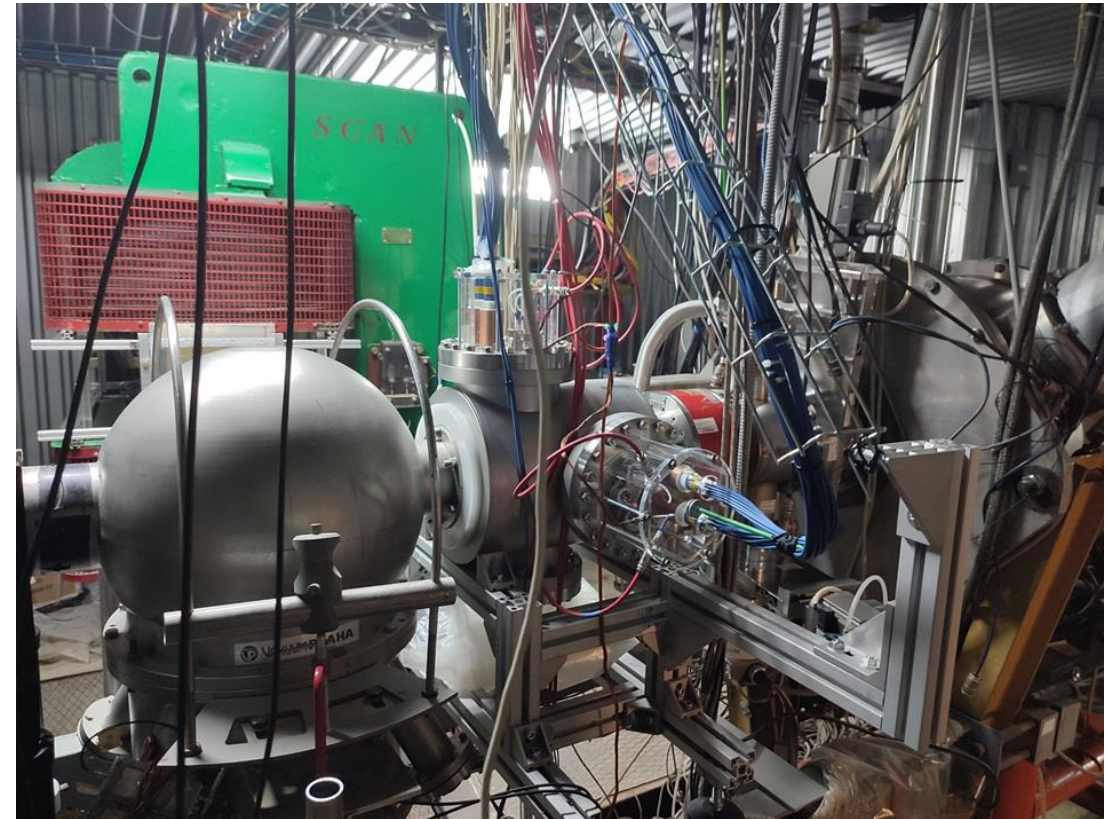
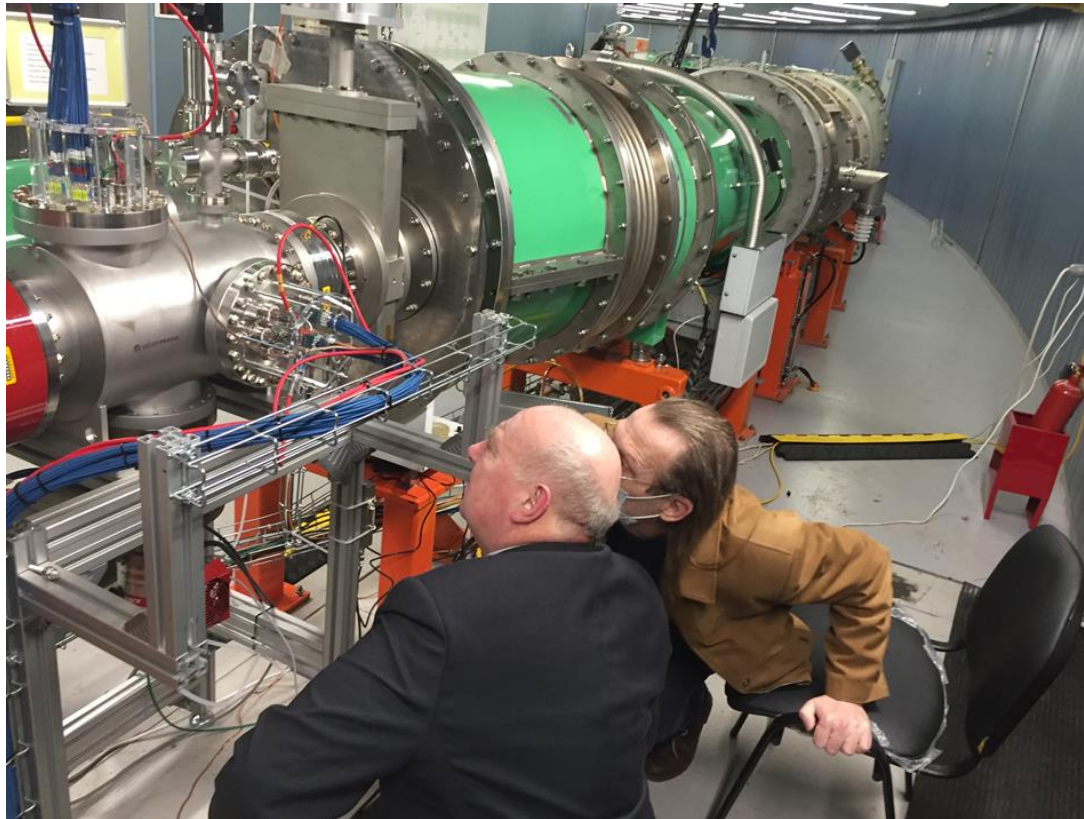
# Structure of MCP profilometer

A.Baldin, A.Berlev, I.Kudashkin, A.Fedorov, Letters to ECHAIA, 2014, vol.11, N°2 (186), p.209-218



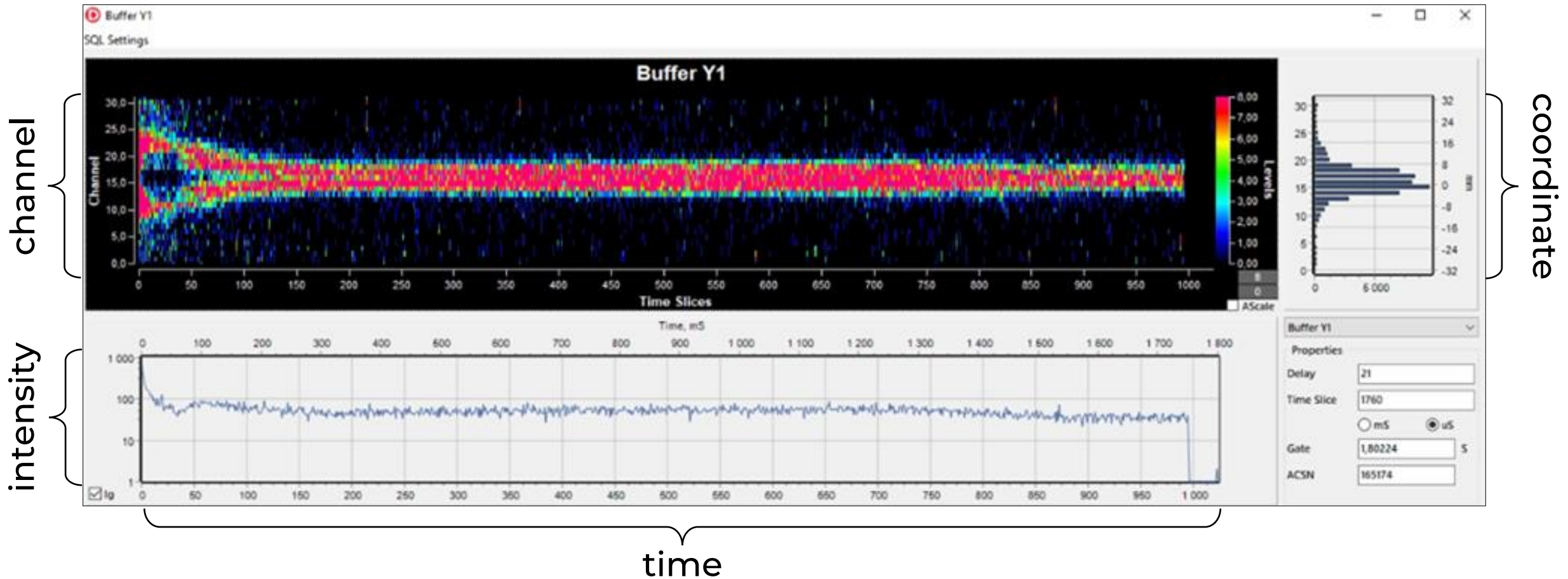


# Profilometer MCP at Booster and Nuclotron





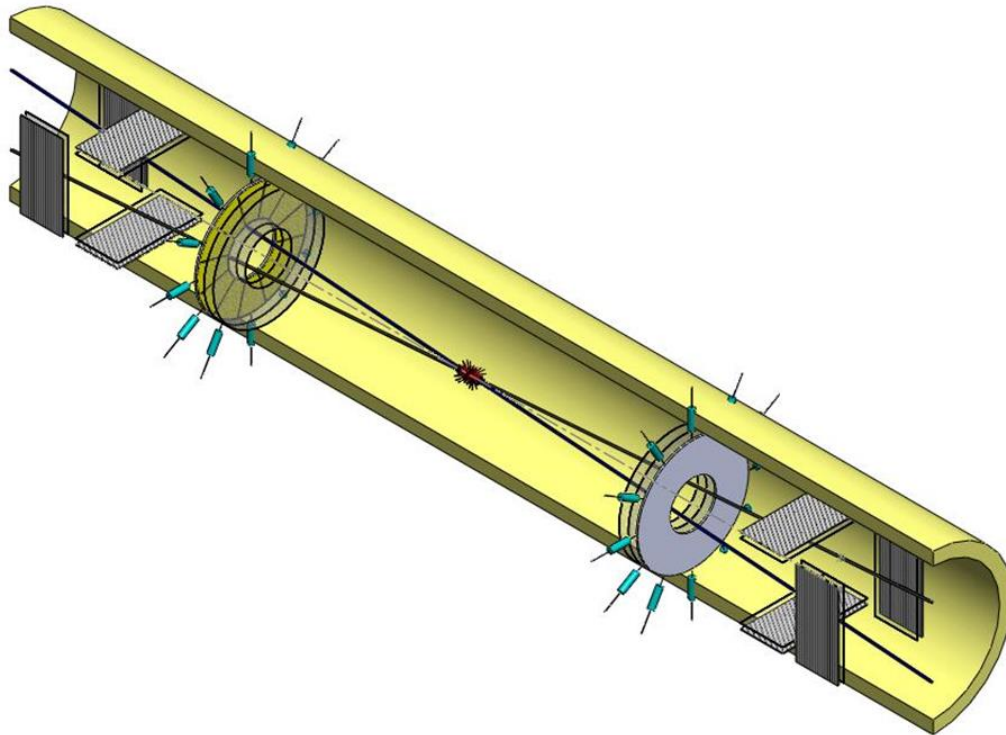
# Dynamic profile of the circulating beam



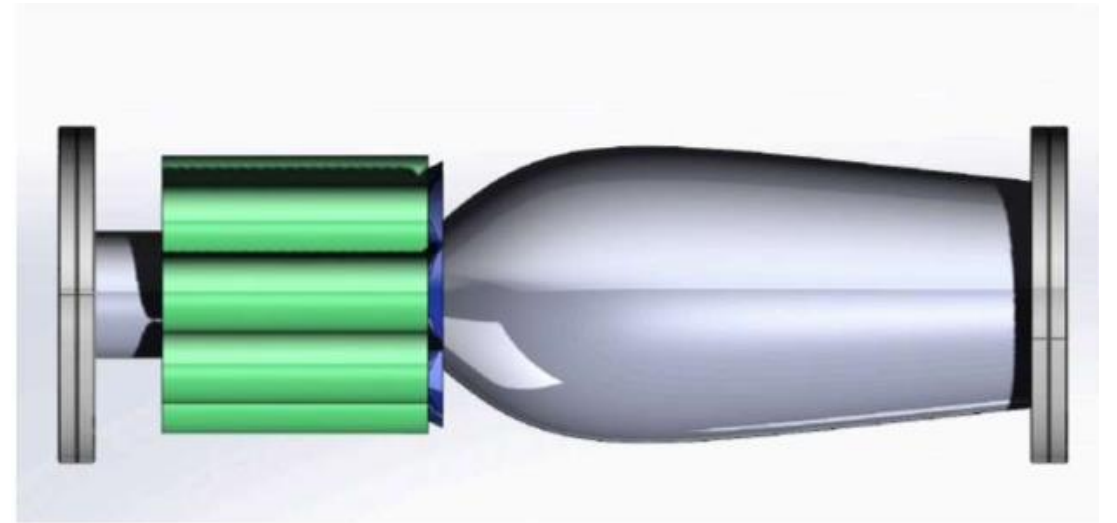
# Vacuum testing of detector prototypes



# BBC MCP concepts



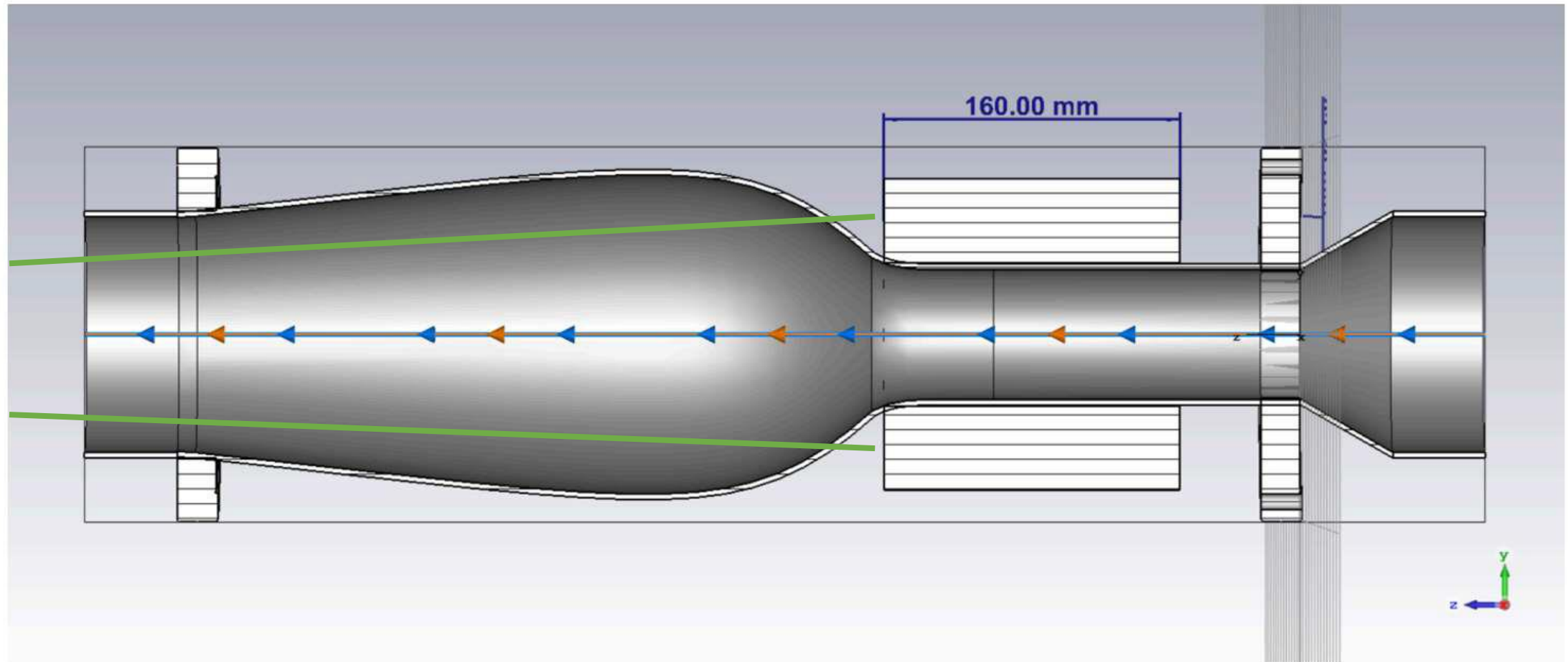
Before



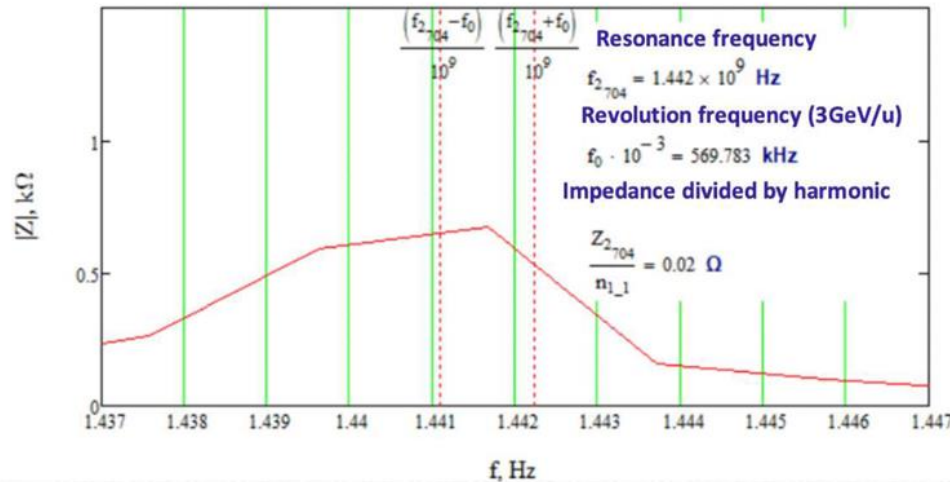
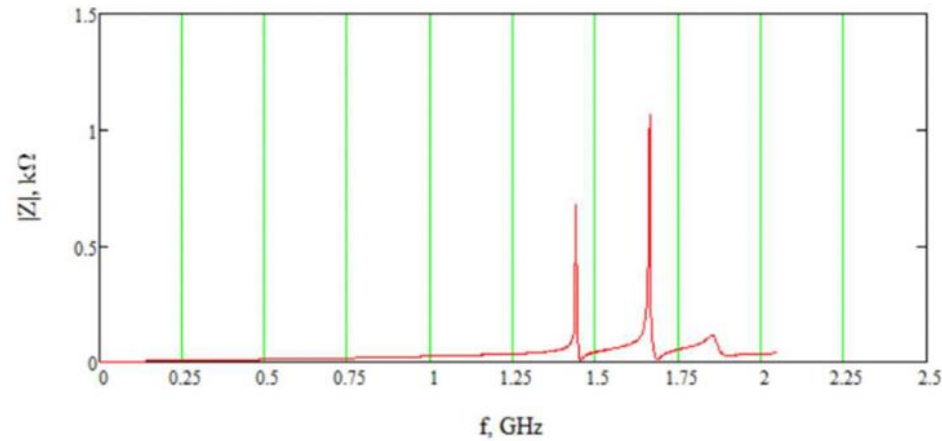
After



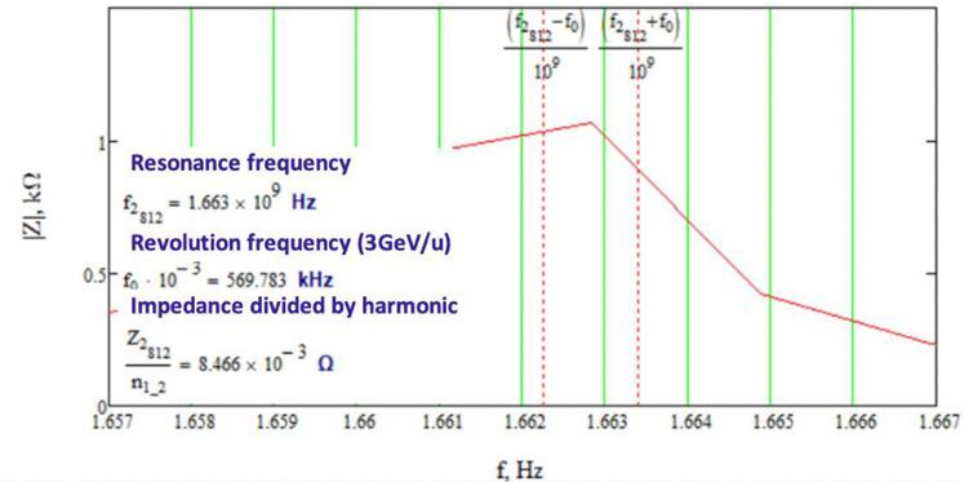
# Geometry of the vacuum chamber used in simulations



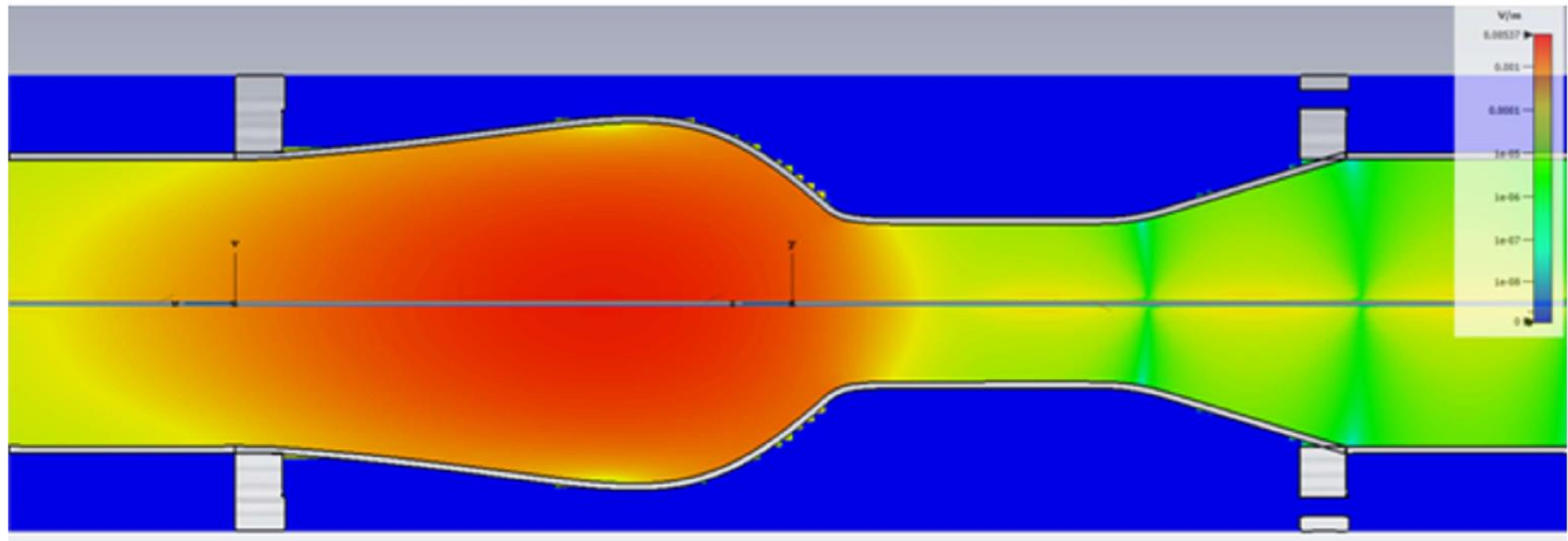
# Results of impedance simulations



**Top** - longitudinal impedance,  
**Bottom left** - impedance details near the peak at 1.44 GHz,  
**Bottom right** - impedance details near peak at 1.66 GHz.

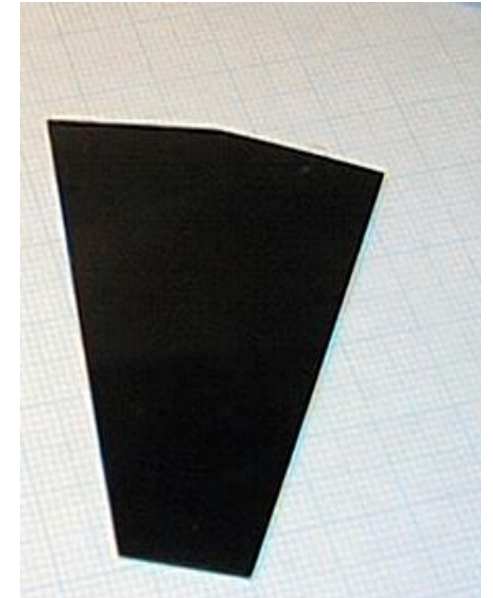


# Results of electric field simulations



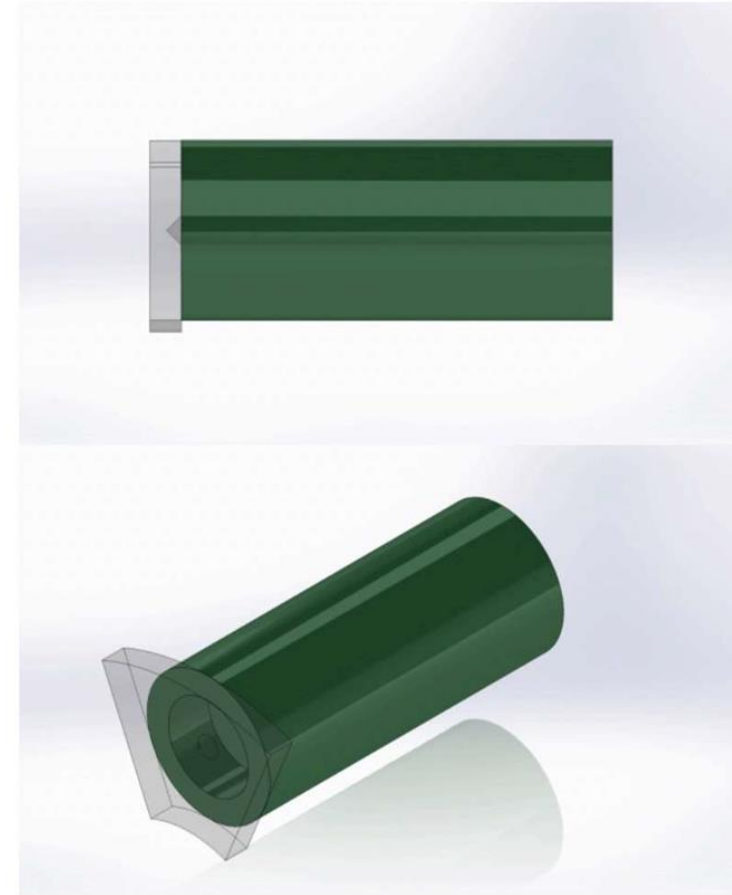
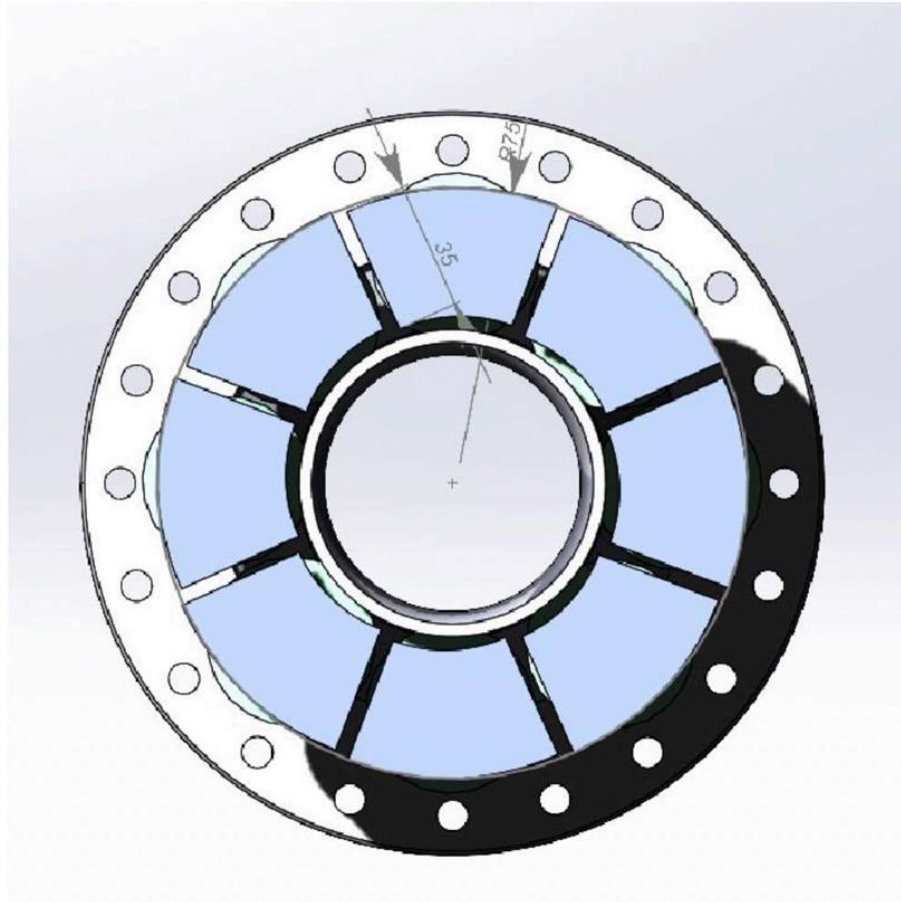


# Topaz MCP photomultiplier



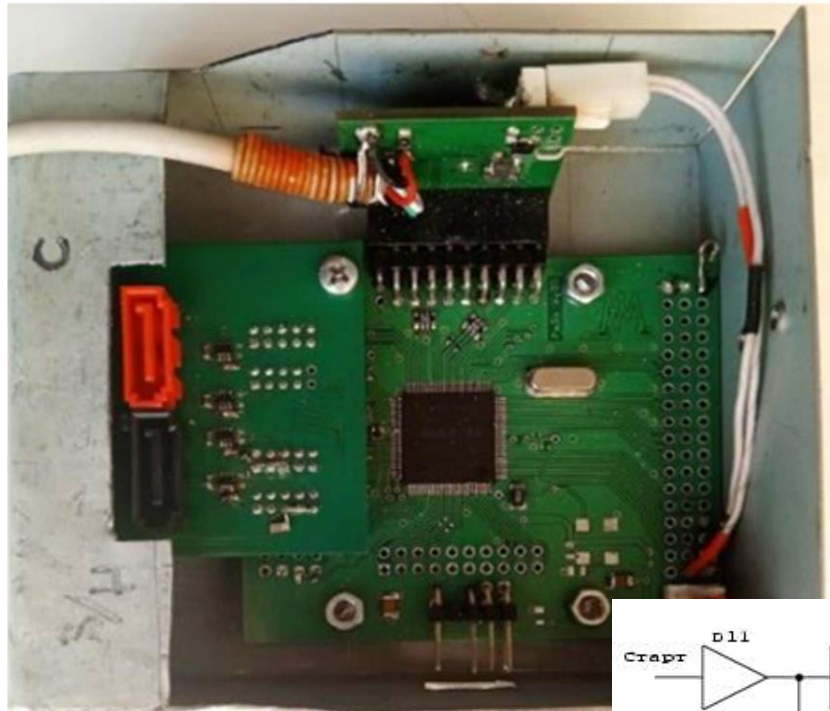
These photomultipliers manufactured by BASPIK (Vladikavkas) are being tested. The time resolution achieved is 50 ps.

# The position of the MCP photomultipliers

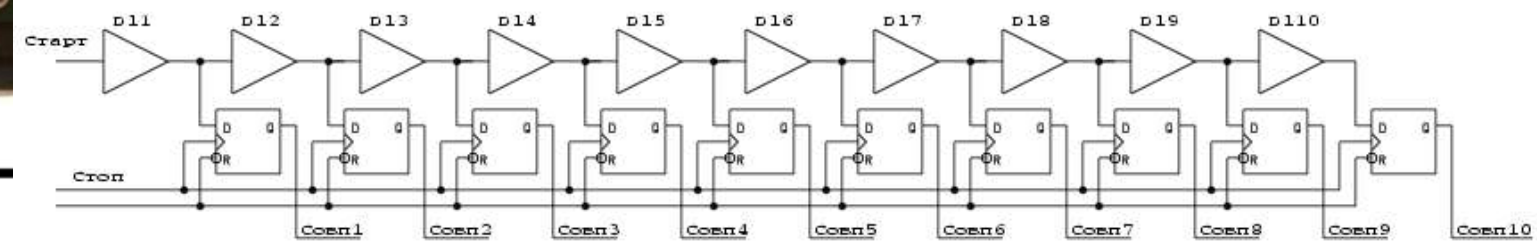
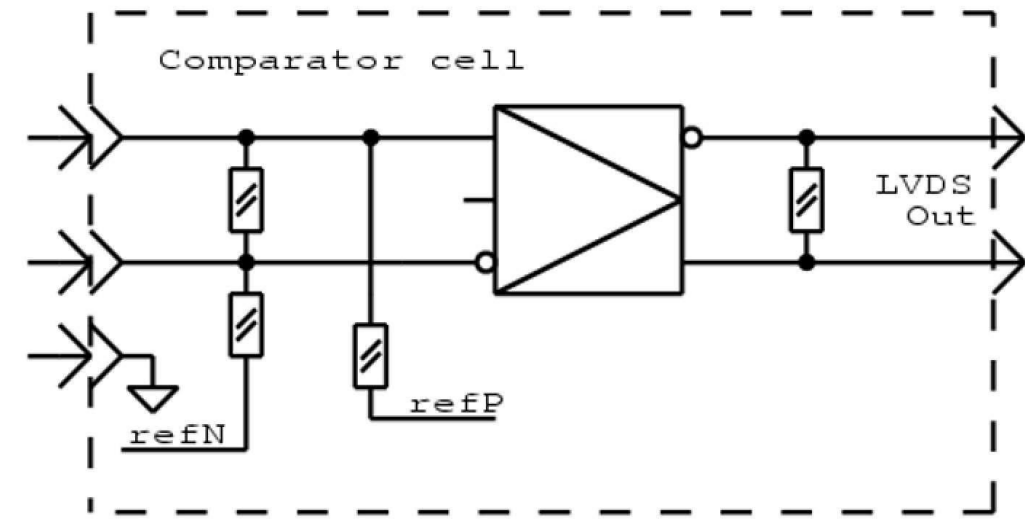


# DAQ electronics

Saint Petersburg State University (G. A. Feofilov)



50 mm





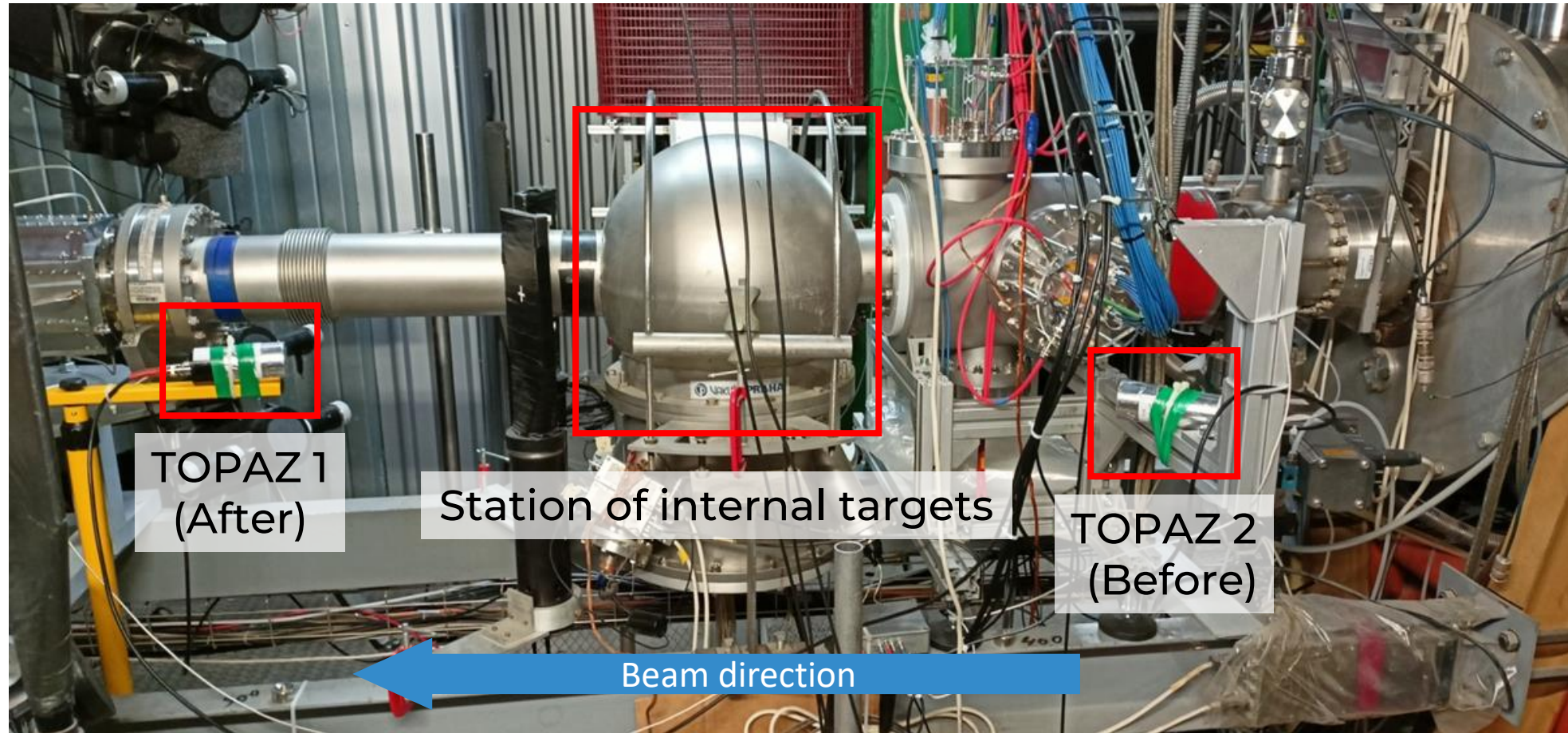
# TQDC

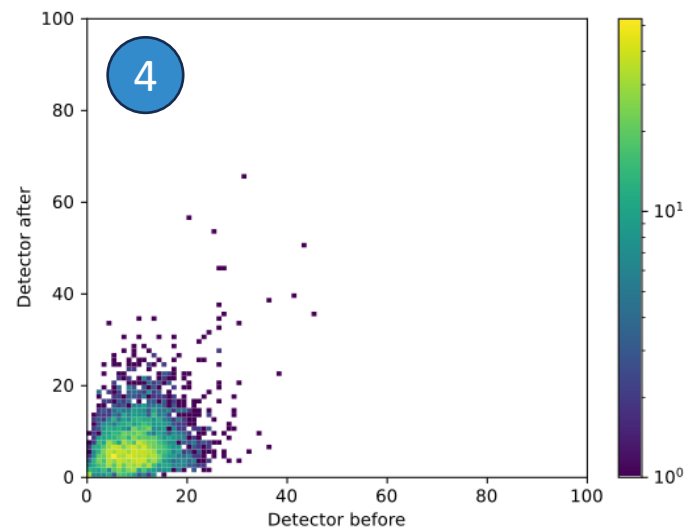
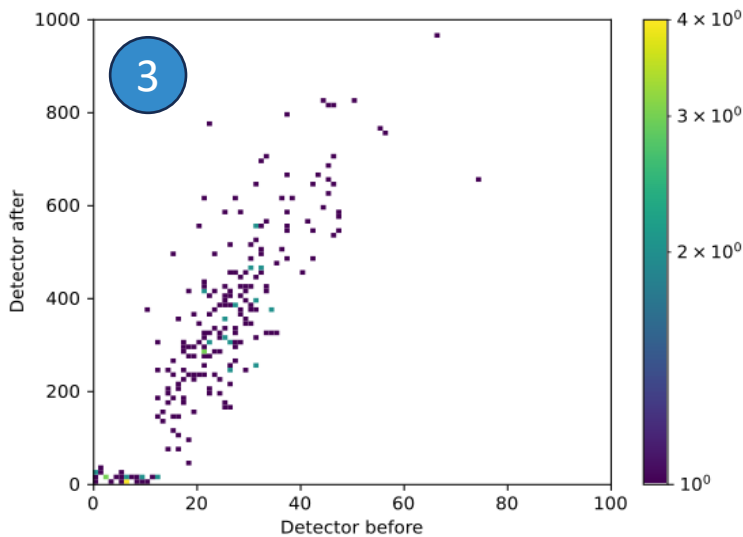
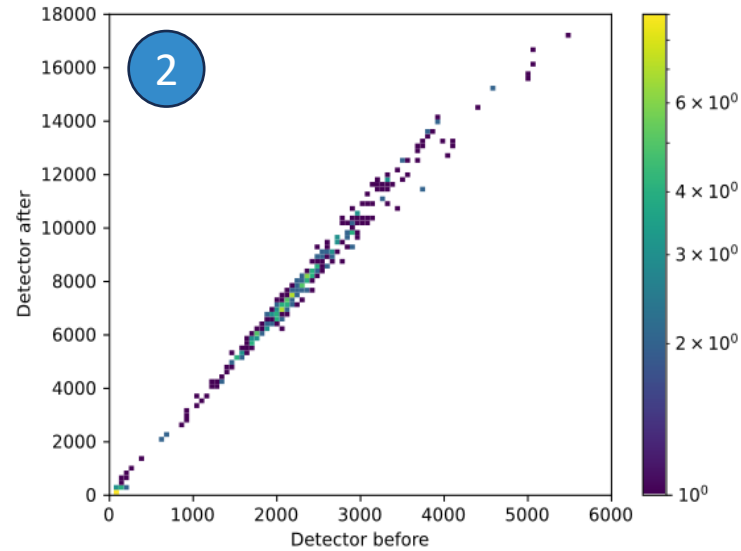
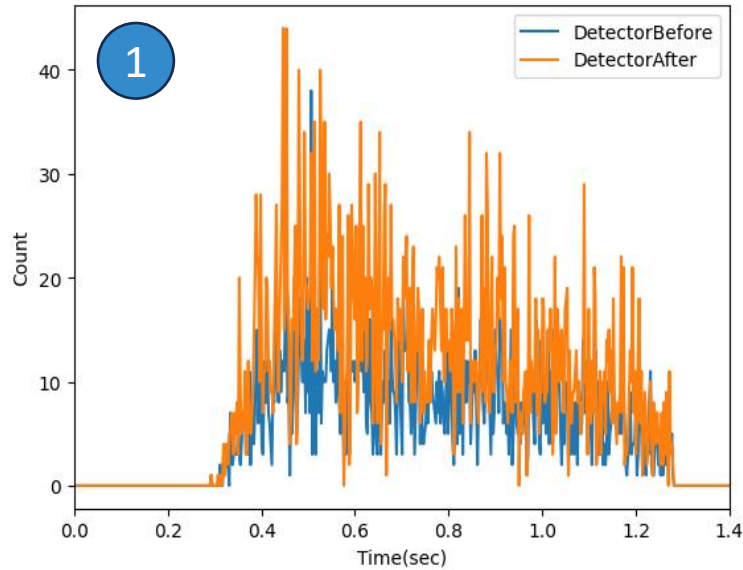
LHEP, JINR



Specifications	
Number of channels	16
Input connector	coaxial, LEMO 00
Input impedance	50 Ohm
Waveform length, samples per channel (VME)	188
Waveform length, samples per channel (ETH)	2048
Sampling rate	125 MS/s
ADC resolution	14 bits
Supply voltage (standalone)	9.0 .. 15.0 V
Supply Power	35 W

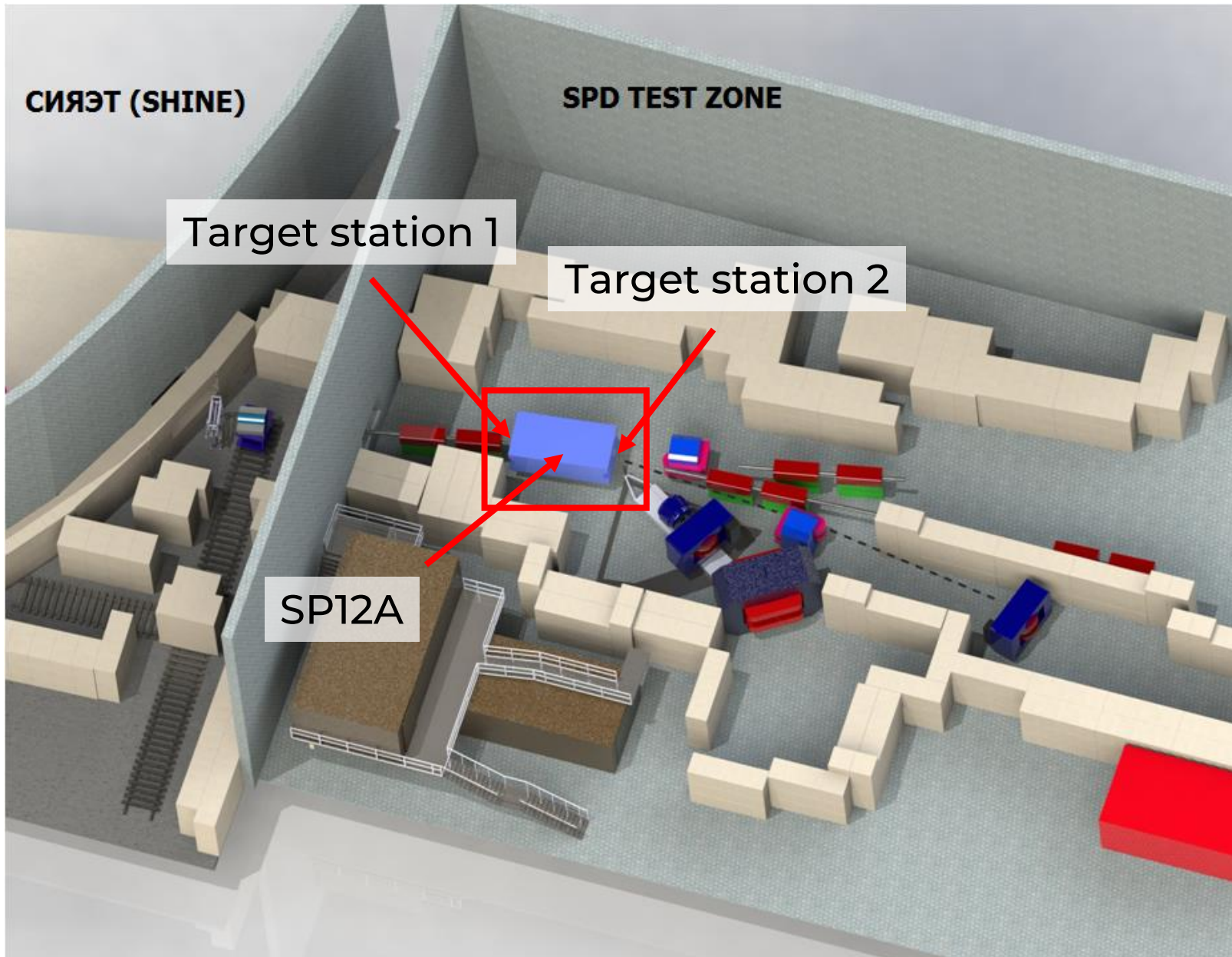
# Station of internal targets at Nuclotron





- 1) The time structure of the samples of the "front" and "rear" detectors with a target
- 2) Counts for tungsten target. **Correlation for two detectors**
- 3) Counts for silver target. **Correlation for two detectors**
- 4) Counts without a target. **No correlation**





# SPD Test zone

~4.5m





# LINAC-200

## DLNP, JINR

The pulse current ranges from single electrons to 40 mA (intensity from  $10^2$  to  $10^{13}$  electrons/s).  
The maximum average current is 2.5  $\mu$ A.  
The beam energy varies smoothly from 20 to 200 MeV.





# Conclusions

- The development of the BBC is progressing
  - The detector design is constantly being improved
  - The simulation results are satisfactory
- MCP is the best solution for BBC MCP at SPD
- SPD tests zone has huge opportunities for studying detectors and prototypes

# Thank you for your attention!

Speaker – Safonov Andrey