

FEASIBILITY TO PERFORM R&D STUDY OF SPD DETECTORS AT U-70 ACCELERATOR

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DETECTORS OF INTEREST

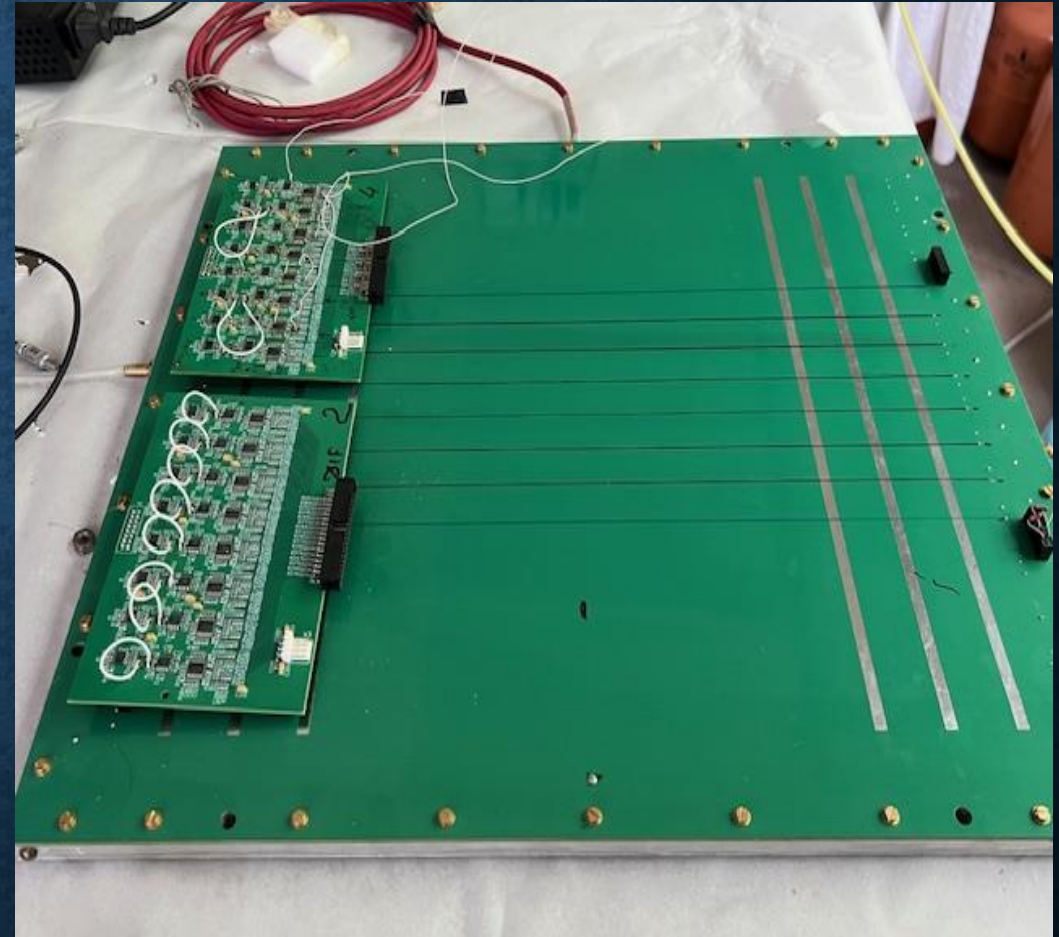
- End-caps electromagnetic calorimeters in collaboration with JINR
- MRPC-based TOF system in collaboration with Lebedev Physical Institute
- BBC (beam-beam counters) in collaboration with JINR and MEPHI
- ZDC (zero degree calorimeter) in collaboration with Kurchatov Institute
- Vertex detector (depends on choice) in collaboration with MSU

STUDIES OF R&D INTEREST

- MRPC TOF
- Forward EM calorimeter
- FARICH
- BBC and ZDC counters
- **Radiation Study**

MRPC TOF

- Technology fully developed at IHEP (<40 ps resolution).
- Full scale SPD prototype and FEE were designed (see right) – **some finance support is required for production new version of FEE card.**
- IHEP (design and test) and Lebedev (production) are ready to produce required number of detectors



MRPC TOF TEST ZONE

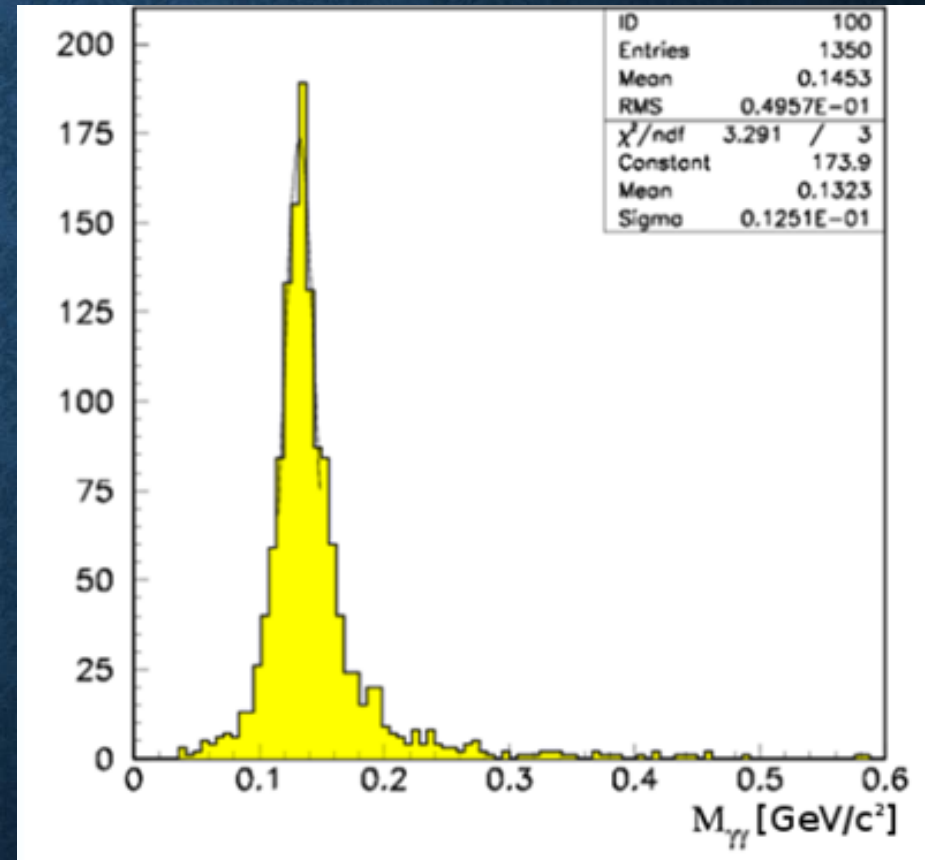
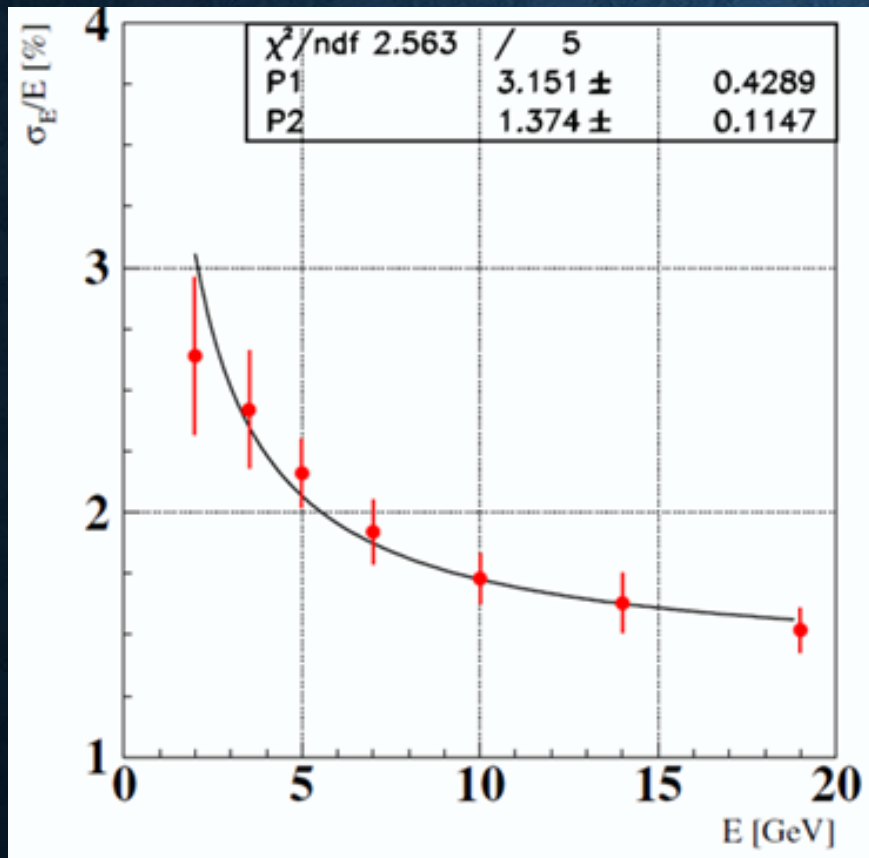
- MRPC test zone is fully equipped and ready for test including Chinese detectors
- In case of production MRPC at China, electronics is required to proceed tests.



END-CUP EM CALORIMETER STUDY

- Study of End-cup EM calorimeter prototypes “on table”
- Study of End-cup EM calorimeter prototypes response and energy/coordinate resolutions in wide energy range (2-19 GeV)
- Study of half(?) -size prototype in real measurements at SPASCHARM experiment
- Beam-line 14:
 - Electron beam from 2 to 19 GeV
 - 2.4 Tm polarized target magnet (or 0.7 Tm spectrometer magnet)
 - 57 planes of track detectors, fiber scintillation hodoscope

EMC STUDY FOR PANDA

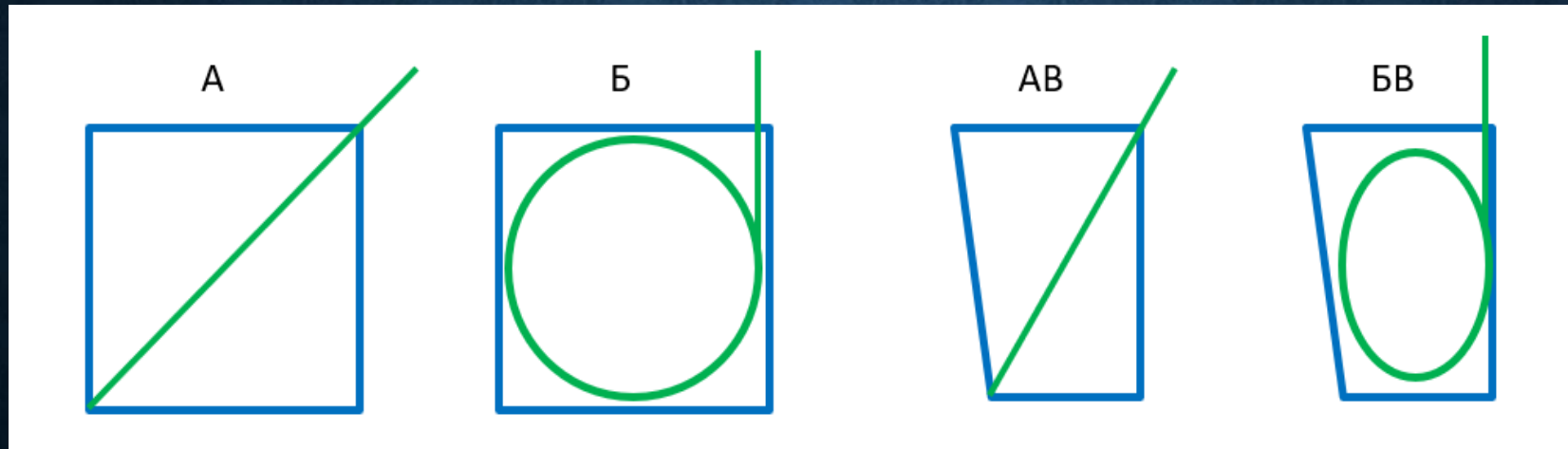


FARICH STUDIES

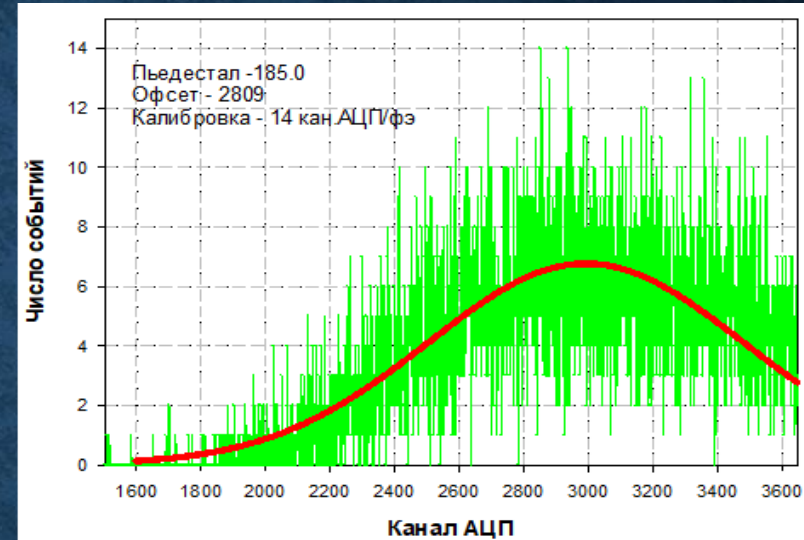
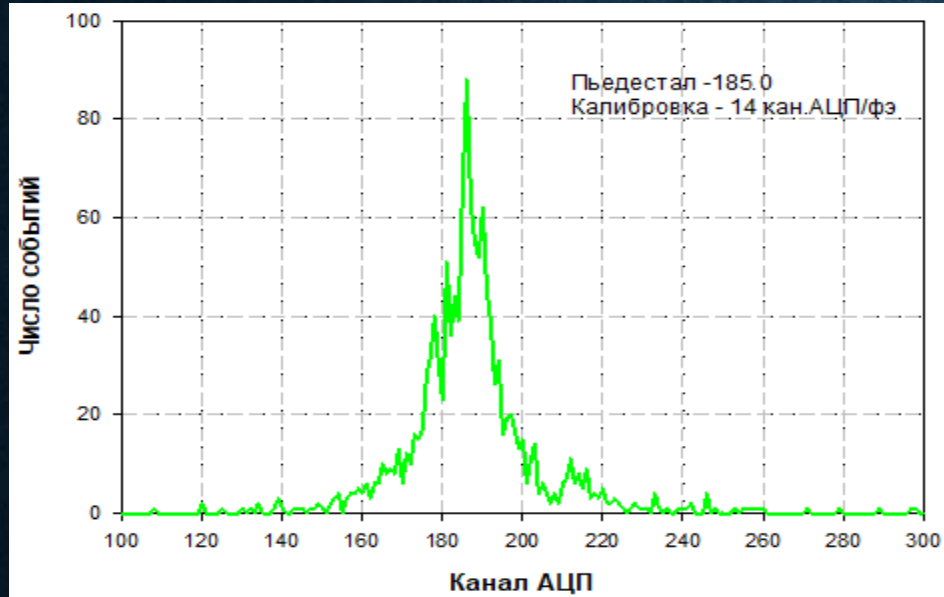
- Short discussion with BINP peoples (Alexander Barnyakov)
- Possible facilities for FARICH study
 - SPASCHARM experimental Setup (Beamline 14) – negative particle beam ($\pi:K:p(\bar{)}=98.3:1.5:0.2$), Energy range 7-26 GeV), 3 threshold Cherenkov counters
 - HYPERON experimental Setup (Beamline 18) – positive particle beam ($\pi:p:K=50:47:3$), Energy range 5-10 GeV), 3 threshold Cherenkov counters
- SPASCHARM experiment is interested in FARICH detector also (large scale prototype or full detector)

BBC AND ZDC COUNTERS

- ZDC counters – collaboration with Kurchatov Institute is under discussion
- Counters can be studied using U70 accelerator complex beams
- BBC counters (collaboration with NRNU MEPHI) – Rykalin group
- Study of light output with SiPM SensL $3 \times 3 \text{ mm}^2 @ 30 \text{ B}$, different shapes and thickness



BBC COUNTERS



Geometry	Thickness, mm	Light output %/phe
A	4	100/97.6
A	10	161.5/157.6
Б	4	137.2/133.9
Б	10	205.5/200.6
АВ	10	166.4/162.4
БВ	10	236.9/231.2

POSSIBLE RADIATION STUDIES

- Gamma irradiation facility !! **Expired Fall 2024 (need to prolongate??)**
 - ^{60}Co source, activity $1 \cdot 10^{12}$ Bq (gamma-source, about 1.25 MeV)
 - Thermo-isolated black box
- Irradiation at U70
 - Irradiation facility at Booster (proton and neutron)
 - Irradiation facilities inside and outside main ring

U70 ACCELERATOR STATUS

- MRPC test bench does not require accelerator time
- Accelerator runs two times in a year
- Duration of data taking run strongly depends on financial situation, program have to be discussed in advance
- Unstable accelerator work due to problem with cooling and booster power supplies
- Plans to renovate current accelerator to restore stable beam and increase beam time