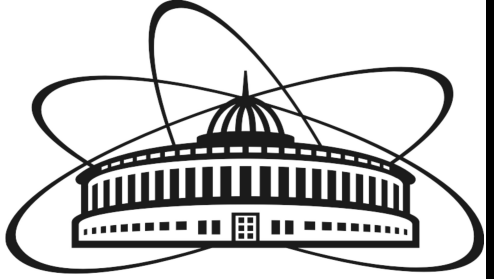


PANDA MUON SYSTEM PROTOTYPE

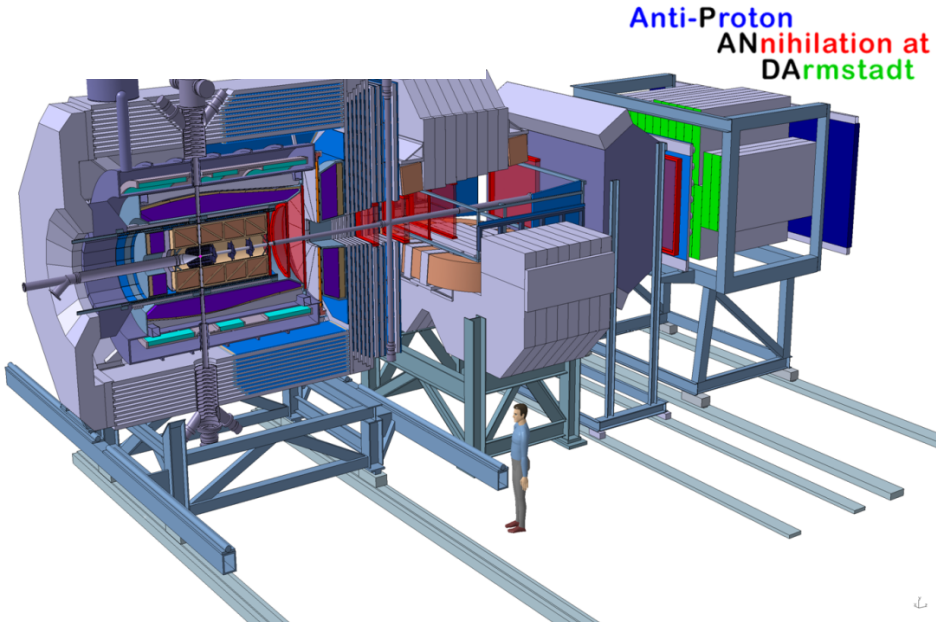
ALEXANDER VERKHEEV (JINR)

AYSS-2017

4 October 2017, Dubna, Russia

EXPERIMENT SETUP

Topics of research: hadron structure and spectroscopy, strange and charm physics, hypernuclear physics with anti-proton beams.



- ppbar, pbarA collisions
  p = 1.5 – 15 GeV/c ,
  (√s from 2.25 up to 5.46 GeV)
- Luminosity up to
  $2 \cdot 10^{32}$ $cm^{-2}s^{-1}$
- Nearly 4π solid angle for large acceptance
- Tracking : ~50 μm vertex resolution
- Different PID techniques for π±, K±, e±, μ±, γ identification, good momentum resolution

PANDA MUON SYSTEM CHARACTERISTICS

Purposes:

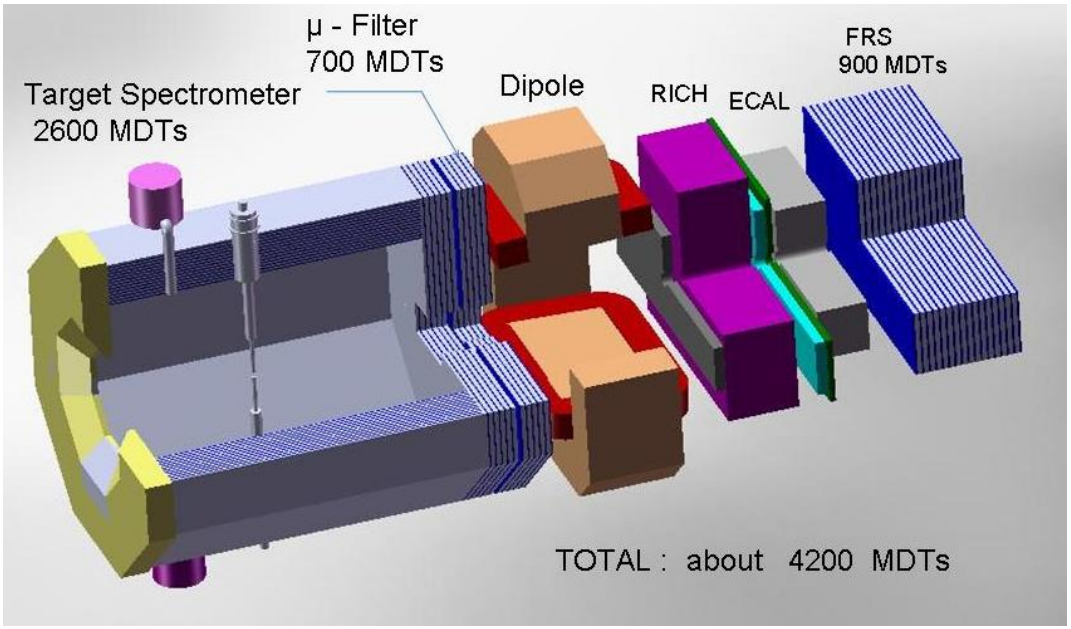
a) registration of muons over the whole PANDA acceptance at different energies;

b) muon separation versus the hadrons (pions, kaons, protons)

Sources of muons - J/Ψ, D-mesons, Drell-Yan pairs

Energy range - 0.3 – 10.0 GeV

Detector technology - Mini-Drift Tubes (MDT) with wire and strip R/O



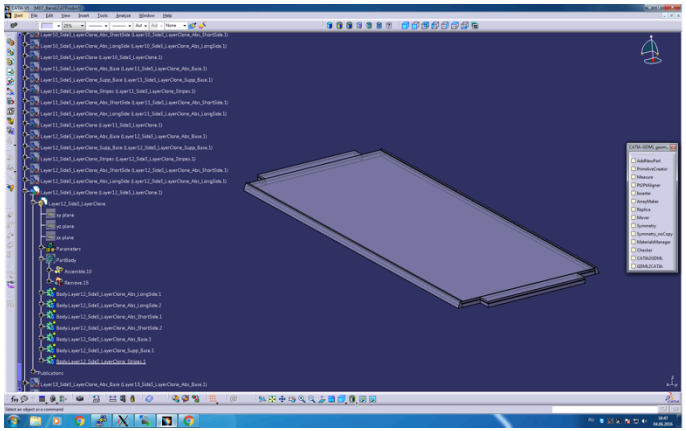
RANGE SYSTEM PROTOTYPE STUDY @ CERN

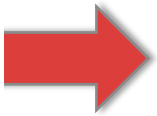
- Calibration of the system's response to the different particles and energies.
- Test of algorithms for μ/π separation
- Tune digitization algorithm
- Technical issues

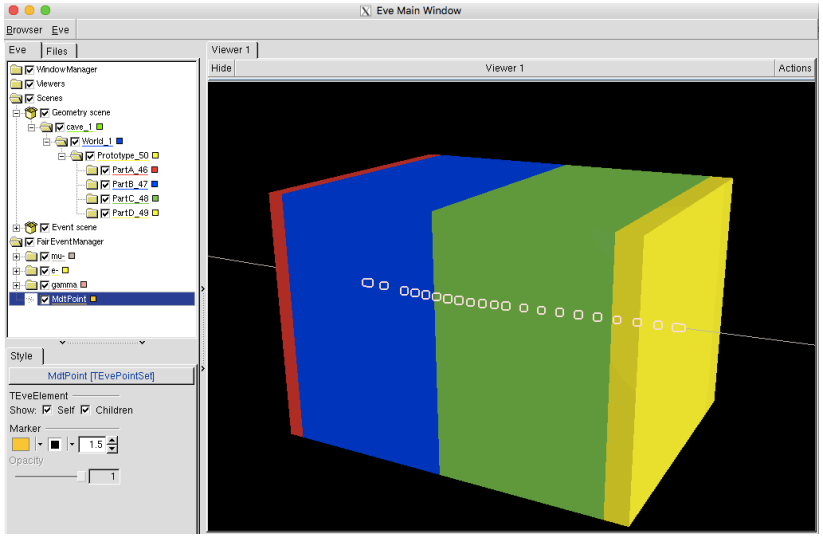
Range System:

- absorber plates;
- detecting layers of MDTs;
- strips between the plates;
- "zero" bi-layers.

CAD AND GEANT4 MODELS OF MUON PROTOTYPE



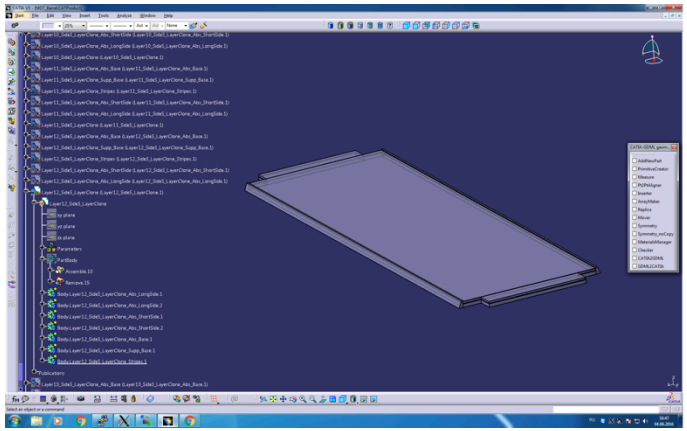


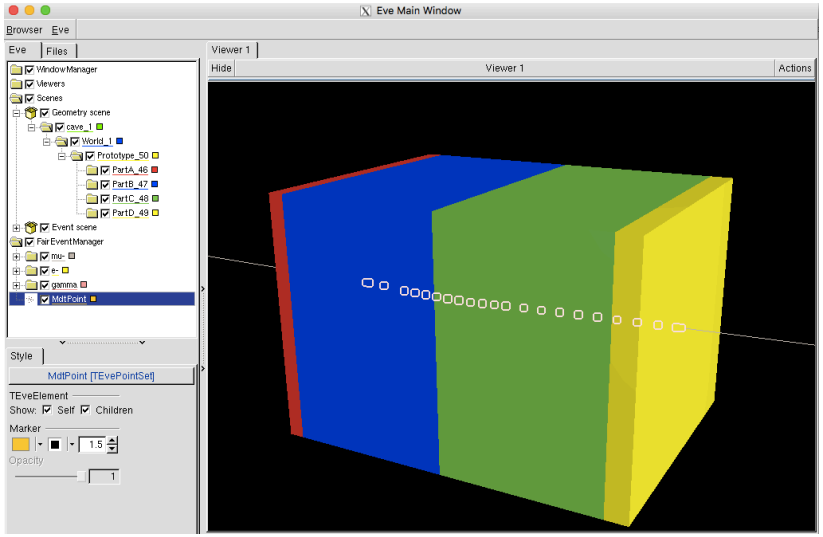


Detector geometry from Computer-Aided Design (CAD) systems

Physical model - particle transport Monte Carlo codes like GEANT4 and ROOT

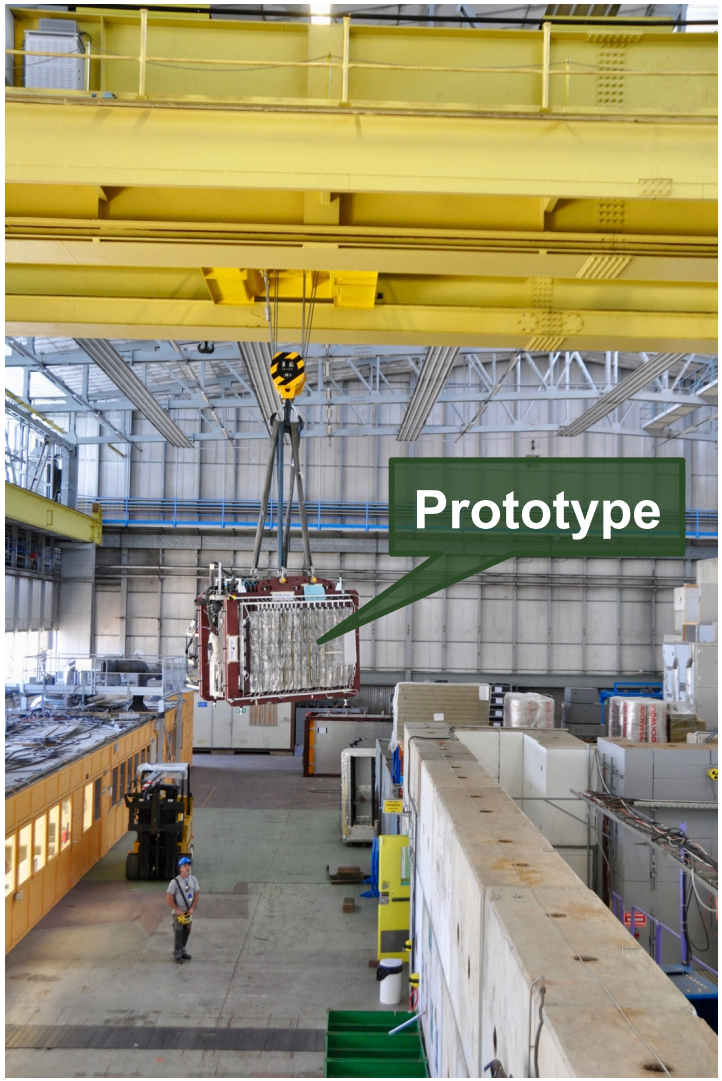
CAD AND GEANT4 MODELS OF MUON PROTOTYPE



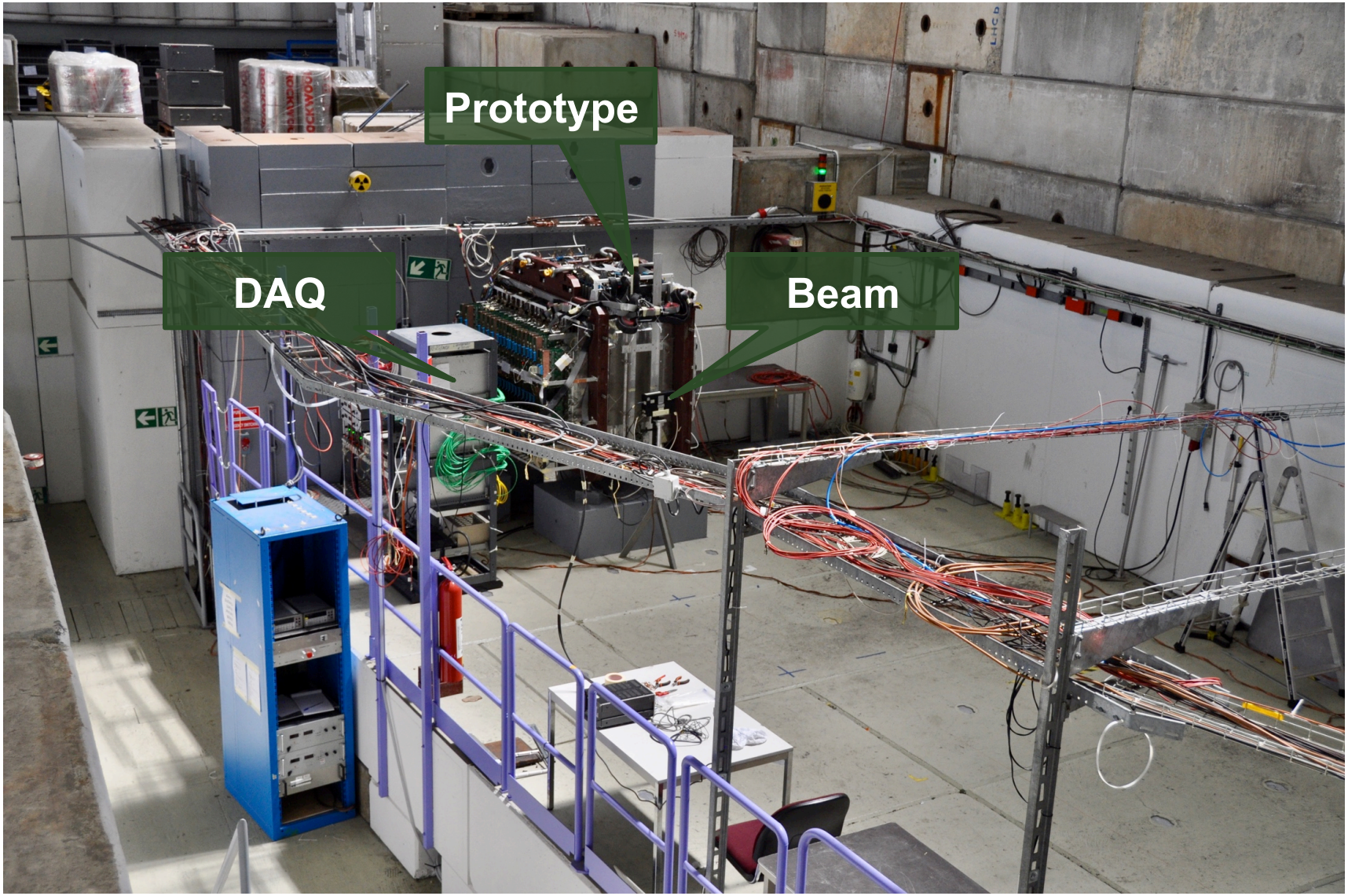


Set of tools allows to exchange the CAD-geometry to G4/ ROOT compatible geometry using Geometry Description Markup Language (GDML).

MOUNTING OF PROTOTYPE @ PS/ EXPERIMENTAL HALL

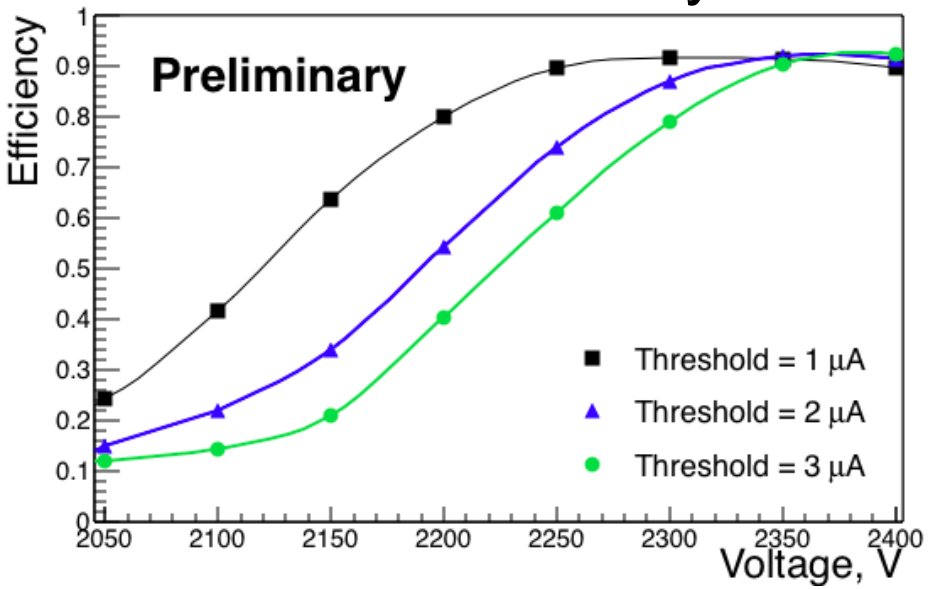


TEST BEAM @ PS/T9 BEAM LINE



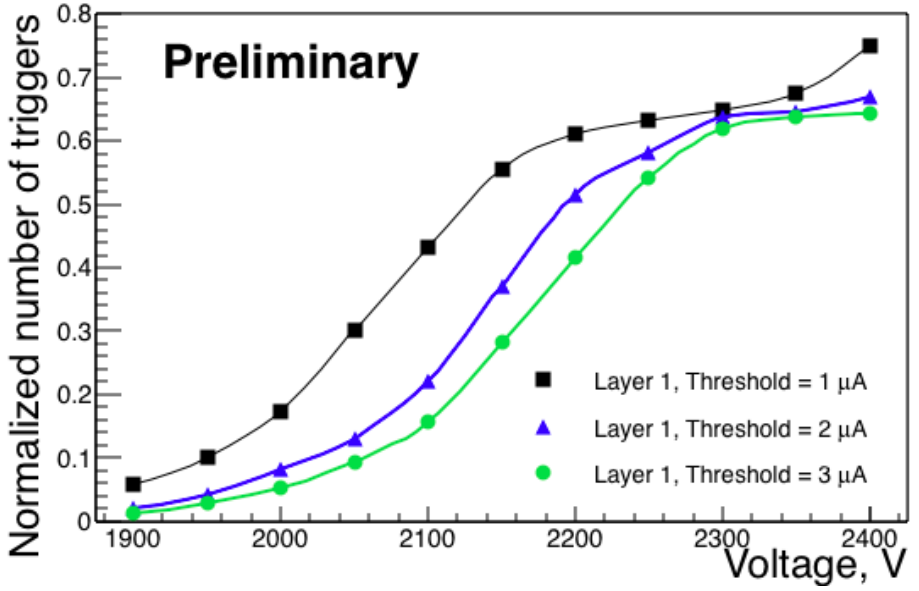
PROTOTYPE DATA (MAY 2017 RUN)

Tube's efficiency

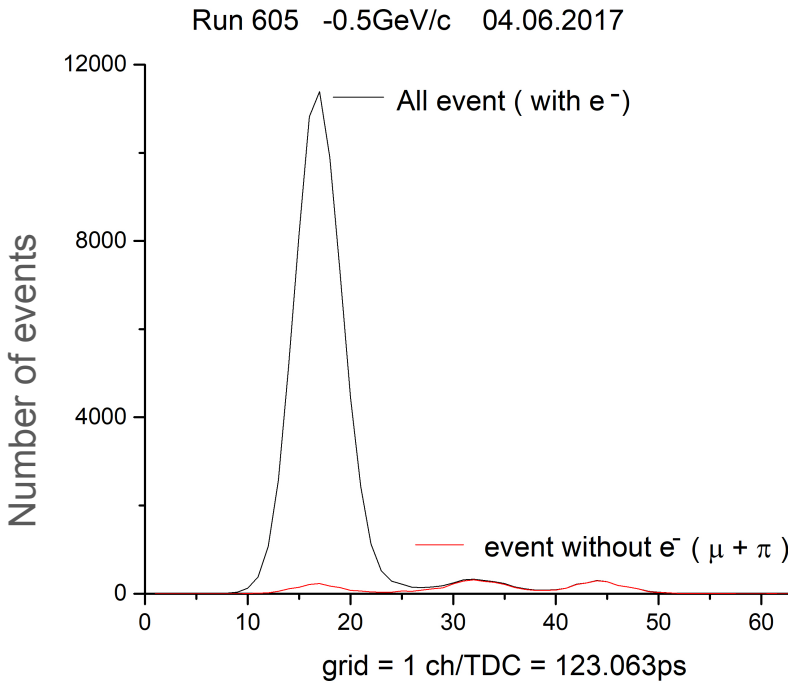


Beam: μ,
E = 2.5 GeV/c

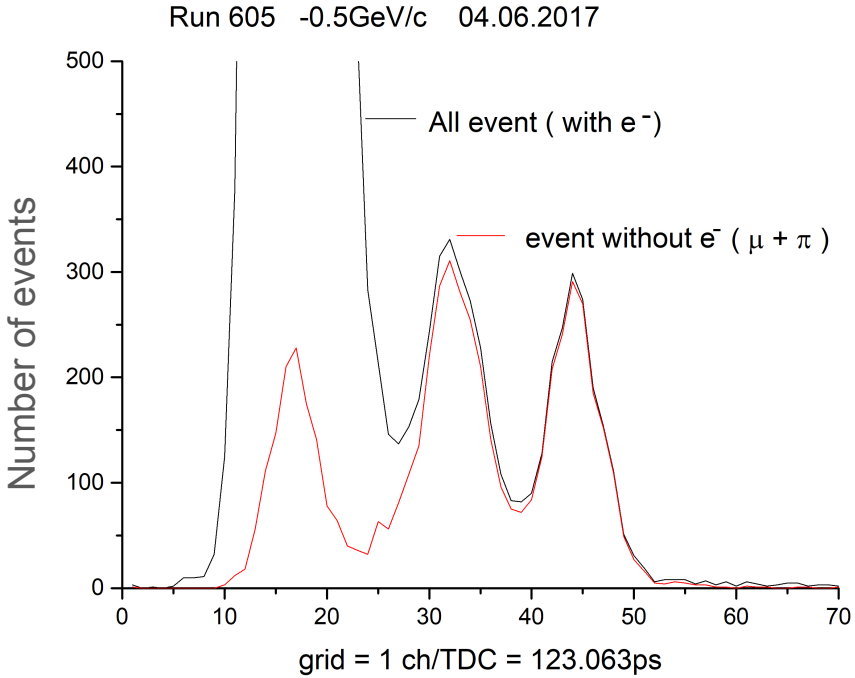
Tube's counting rate



PROTOTYPE DATA FROM BEAM ToF

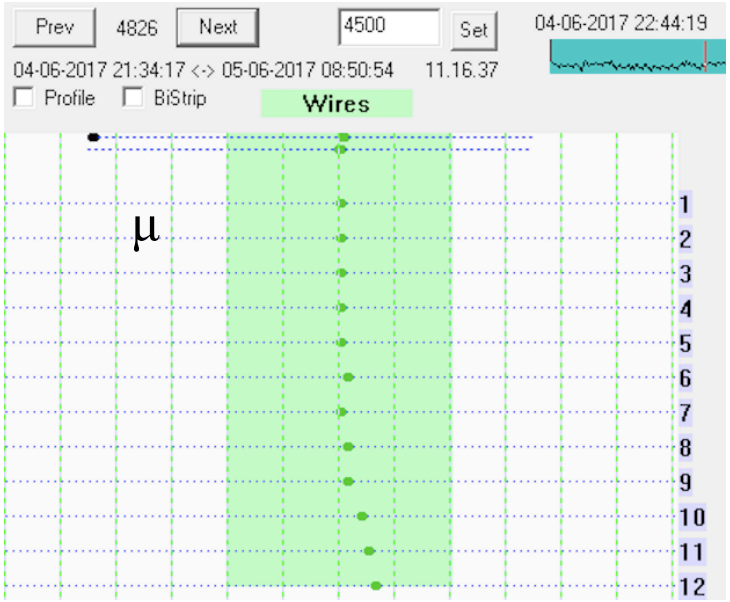


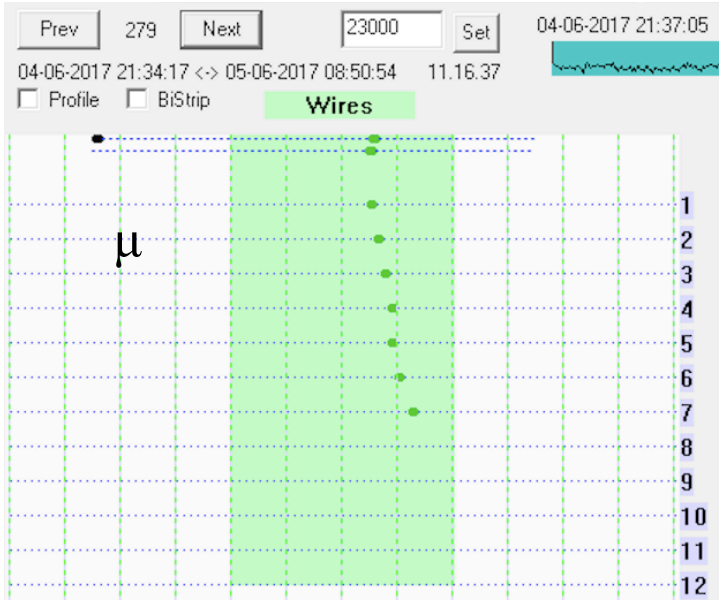
ZOOM

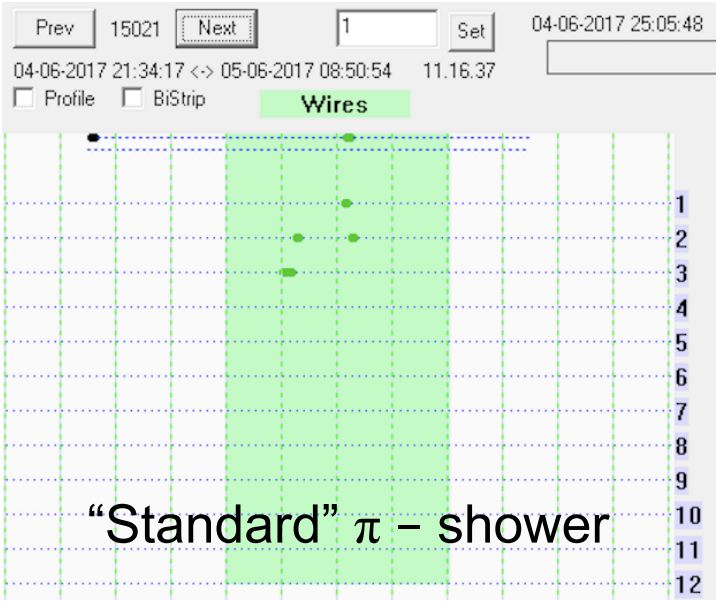


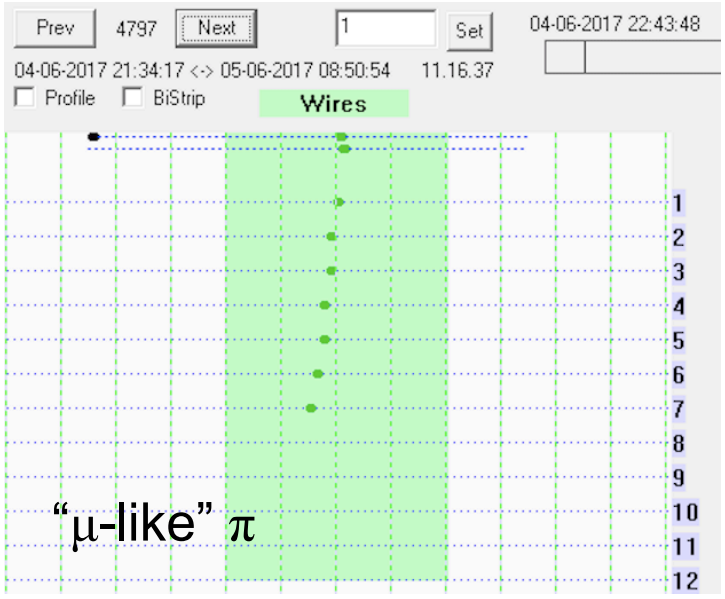
PROTOTYPE DATA (μ vs π)

Run 605
E = 0.5 GeV/c





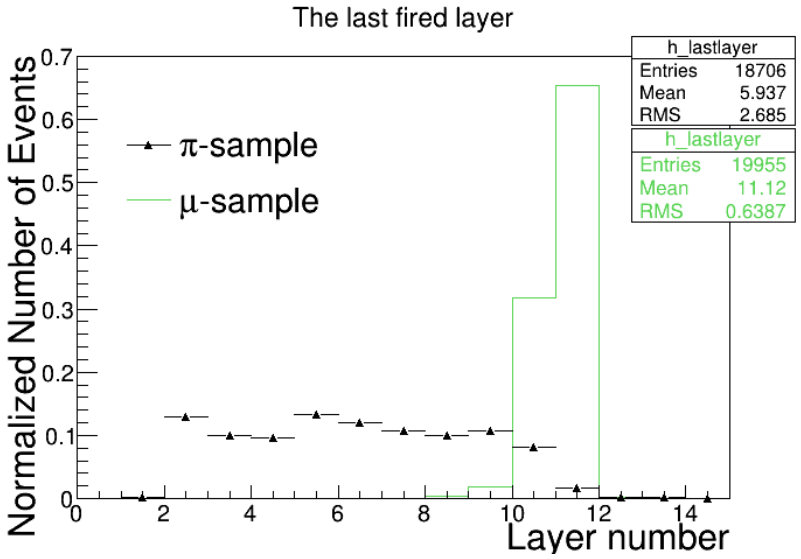


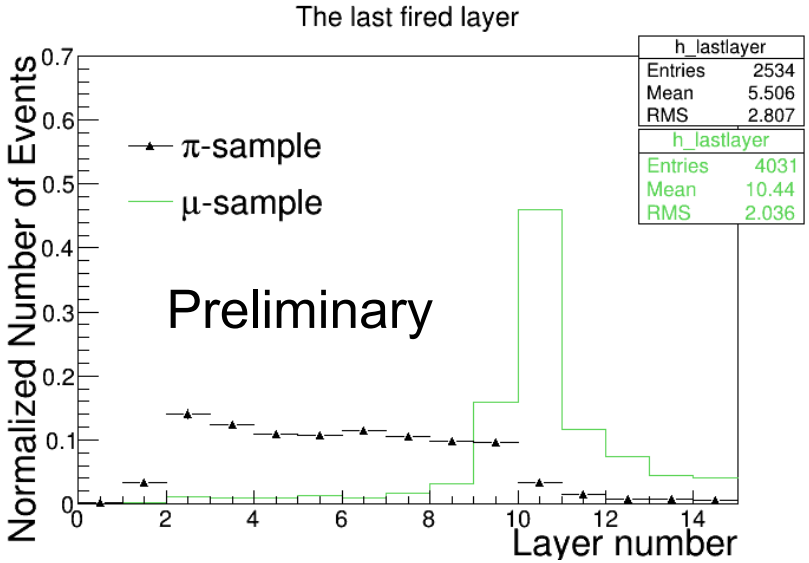


RESULTS FROM THE PROTOTYPE

We have developed the class for Prototype in PANDARoot framework which describes the Prototype's geometry and allows to get MC.

E = 0.5 GeV/c MC DATA, 2017





SUMMARY

- The model of the Panda Muon System Prototype is ready to transfer to PANDARoot software
- We have performed simulation of events with μ and hadrons.
- Prototype will be modified and new planes will be added for 2018 run.