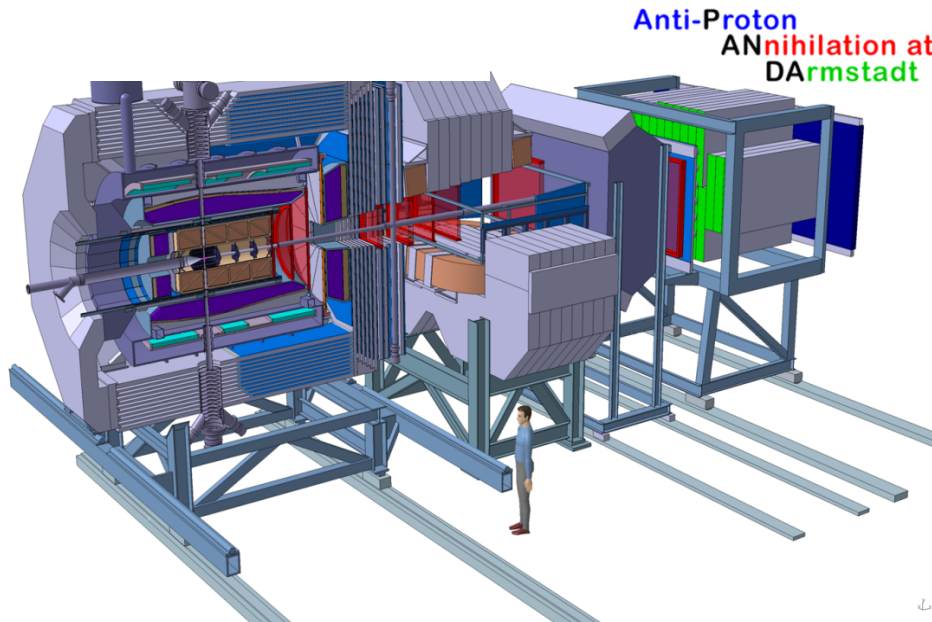# PANDA MUON SYSTEM PROTOTYPE

ALEXANDER VERKHEEV (DLNP)

30 November 2017, Dubna, Russia

EXPERIMENT SETUP

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

Anti-Proton
ANnihilation at
DArmstadt

- ppbar, pbarA collisions
  p = 1.5 – 15 GeV/c ,
  ($\sqrt{s}$ 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
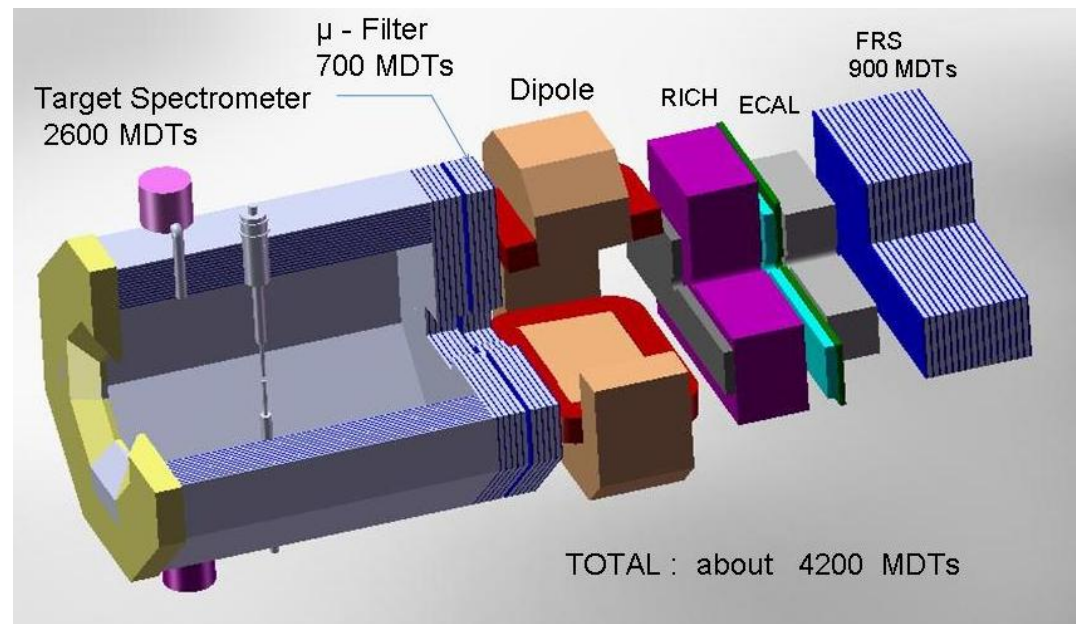
PANDA MUON SYSTEM CHARACTERISTICS

Purposes:

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

b) muon separation versus the hadrons (pion, kaon, proton)

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

μ - Filter
700 MDTs

Target Spectrometer
2600 MDTs

Dipole

RICH   ECAL

FRS
900 MDTs

TOTAL : about 4200 MDTs

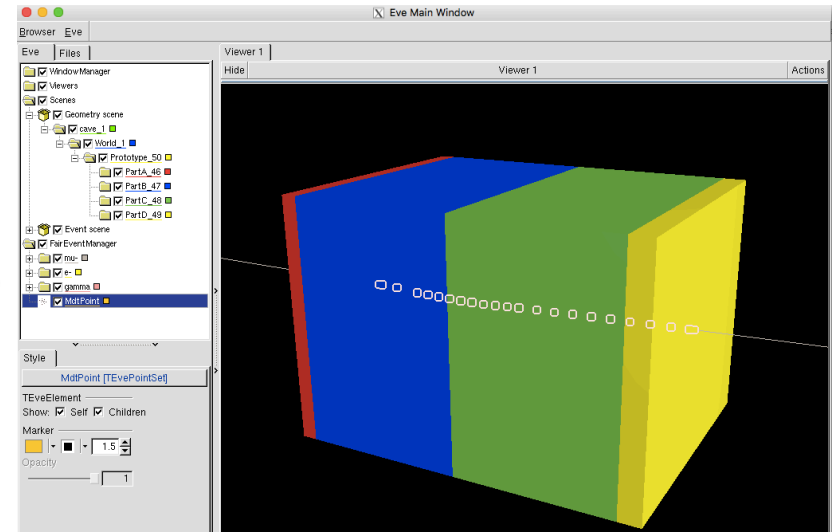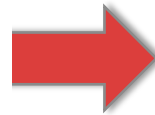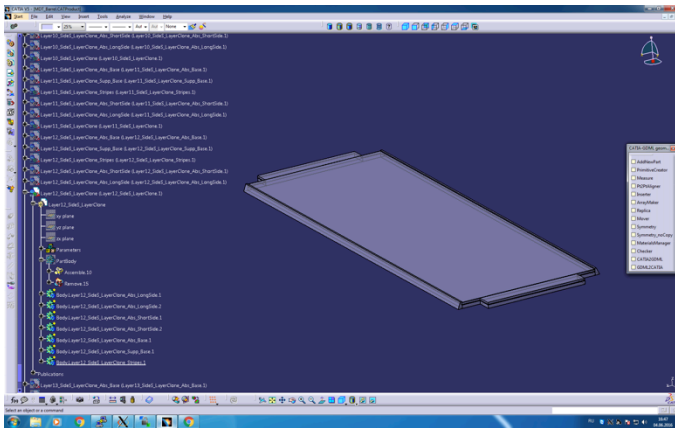# RANGE SYSTEM PROTOTYPE STUDY @ CERN

- 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.

A2DB-32 cards for wire R/O, 2160 channels

Strip R/O side, ADB-32 cards are removed during MDT planes insertion, 2026 channels
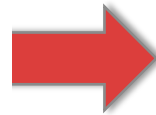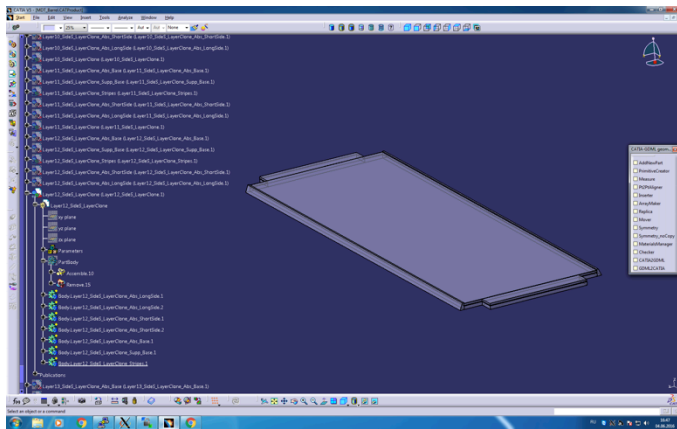
CAD AND GEANT4 MODELS OF MUON PROTOTYPE

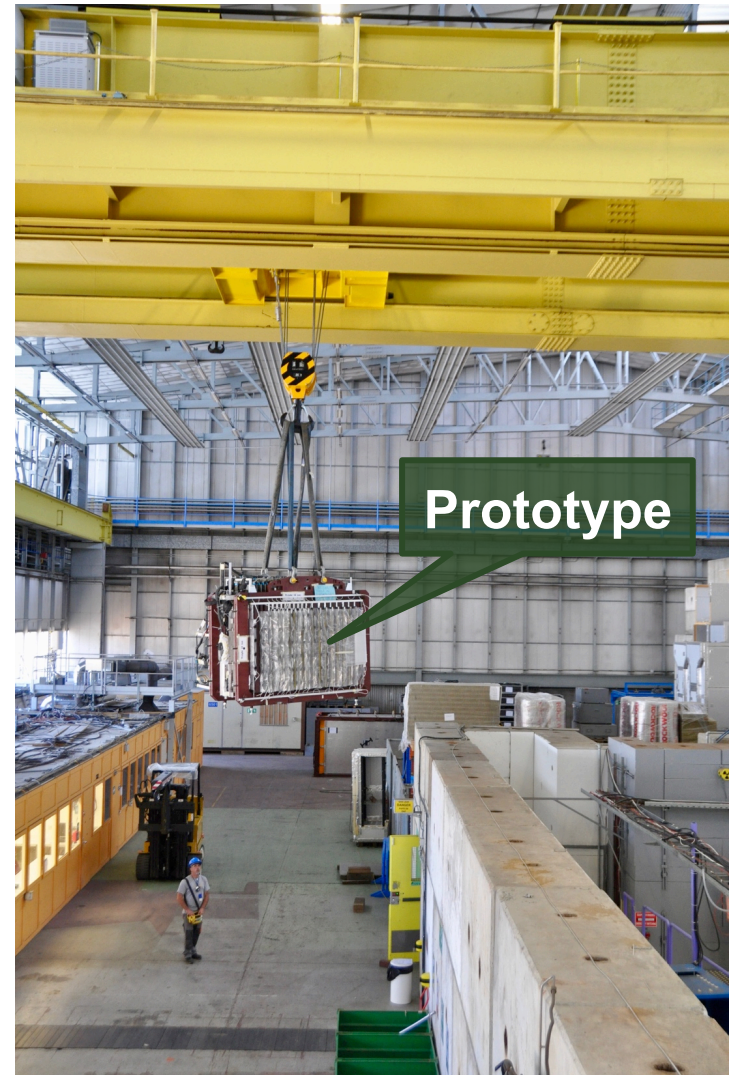Detector geometry from Computer-Aided Design (CAD) systems

Physical model - particle transport Monte Carlo codes like GEANT4 and ROOT
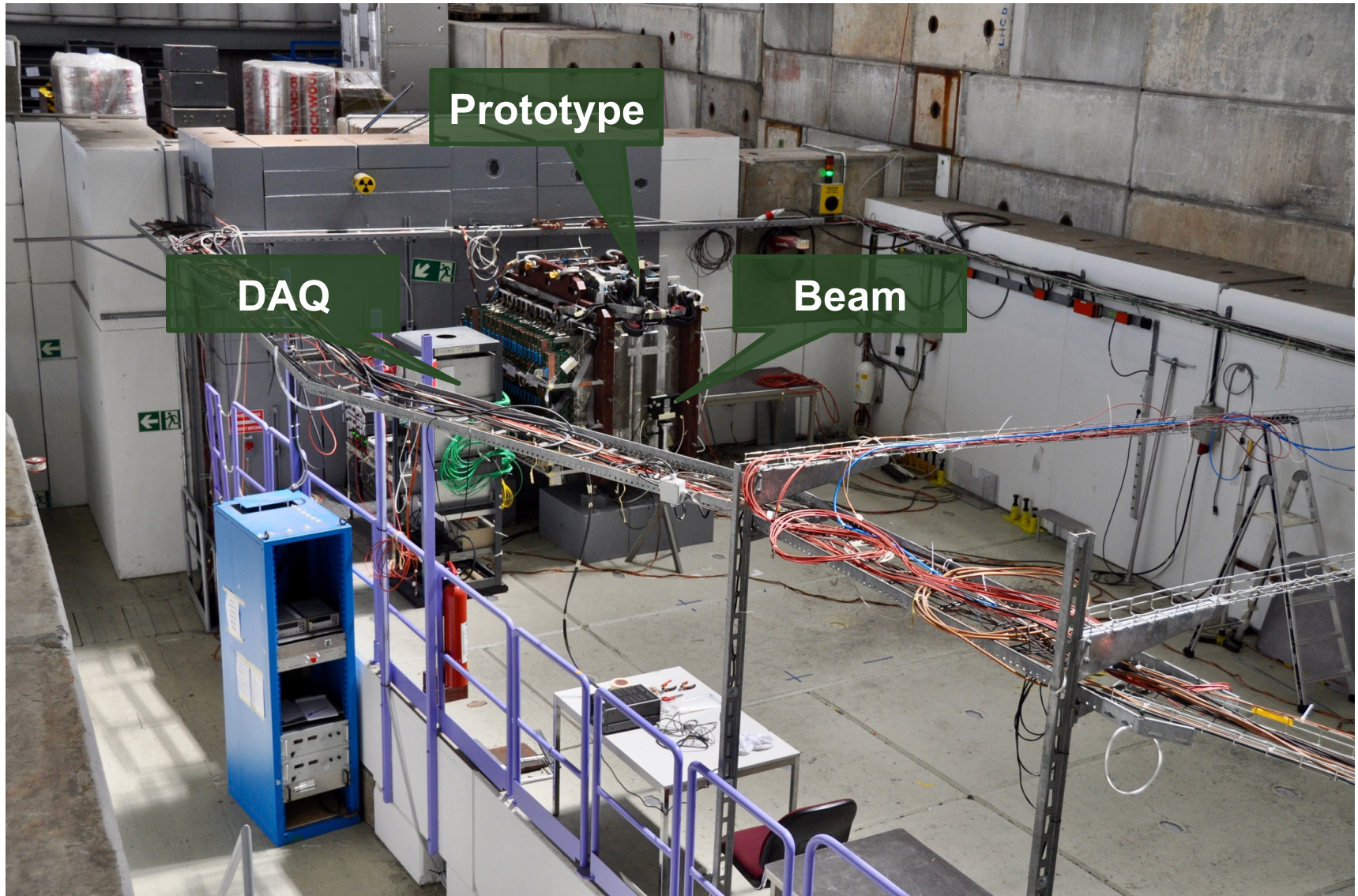
CAD AND GEANT4 MODELS OF MUON PROTOTYPE
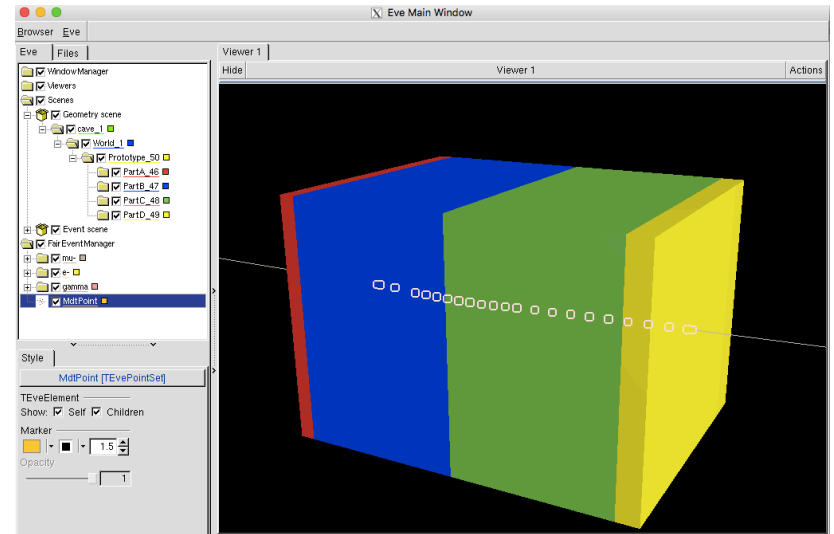
Set of tools allows to exchange the CAD-geometry to G4/ROOT compatible geometry using Geometry Description Markup Language (GDML).
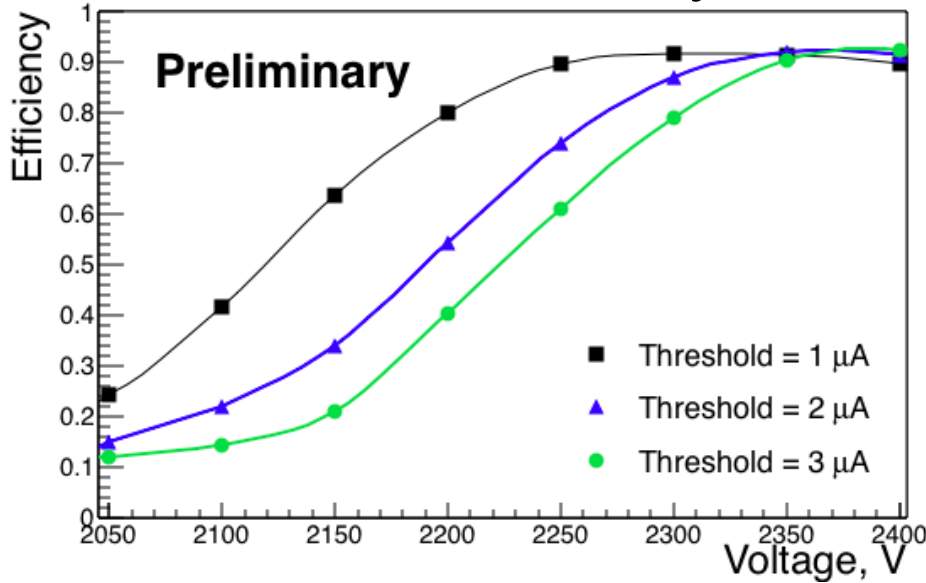
MOUNTING OF PROTOTYPE @ PS/ EXPERIMENTAL HALL

Turn-table

Prototype

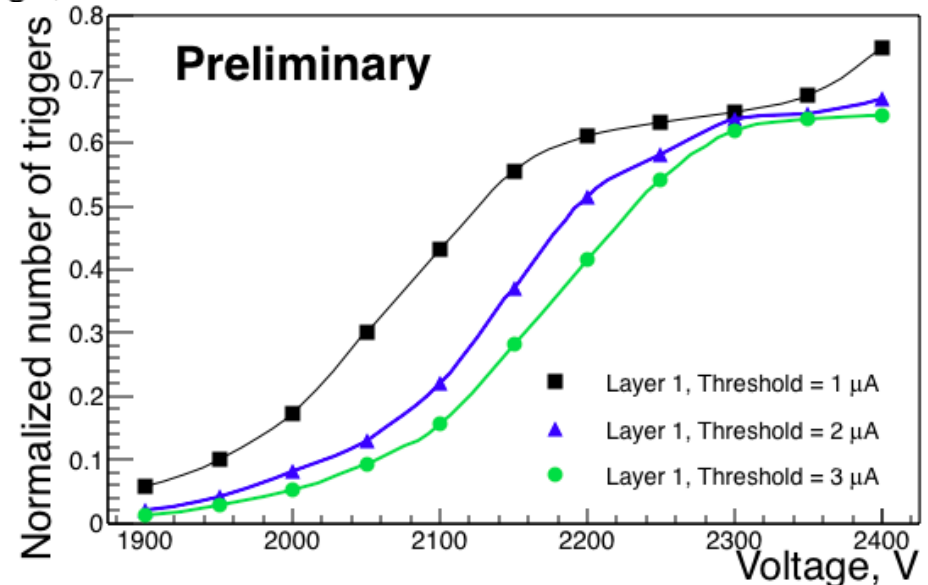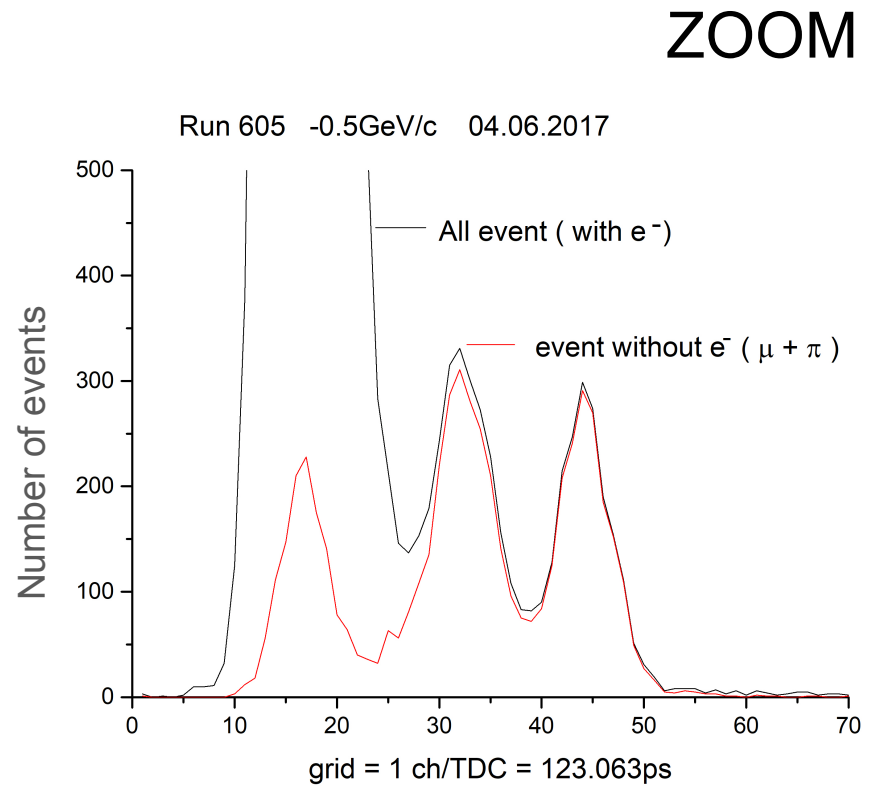# TEST BEAM @ PS/T9 BEAM LINE

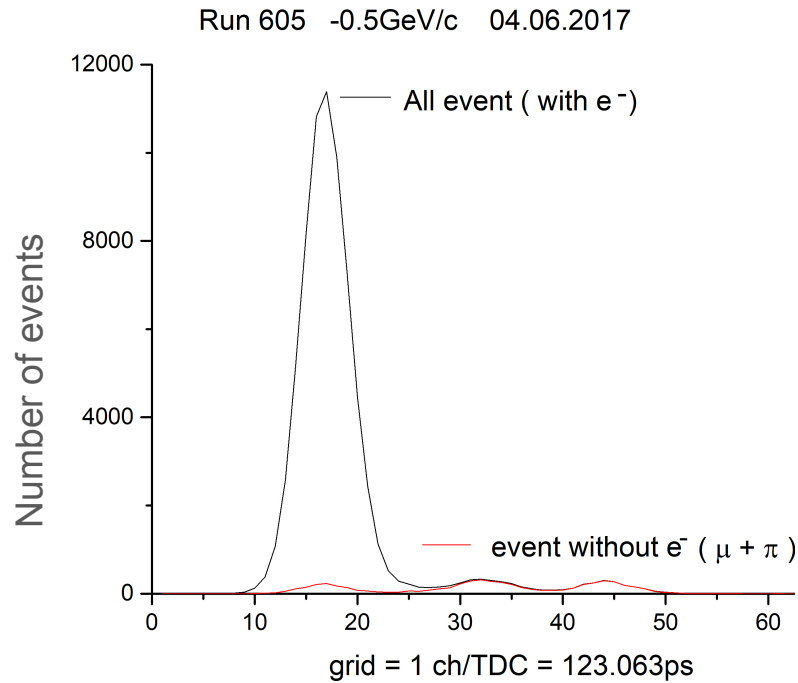# PROTOTYPE DATA (MAY 2017 RUN)

Tube's efficiency

Beam: μ,
P = 2.5 GeV/c

Tube's counting rate

PROTOTYPE DATA FROM BEAM ToF

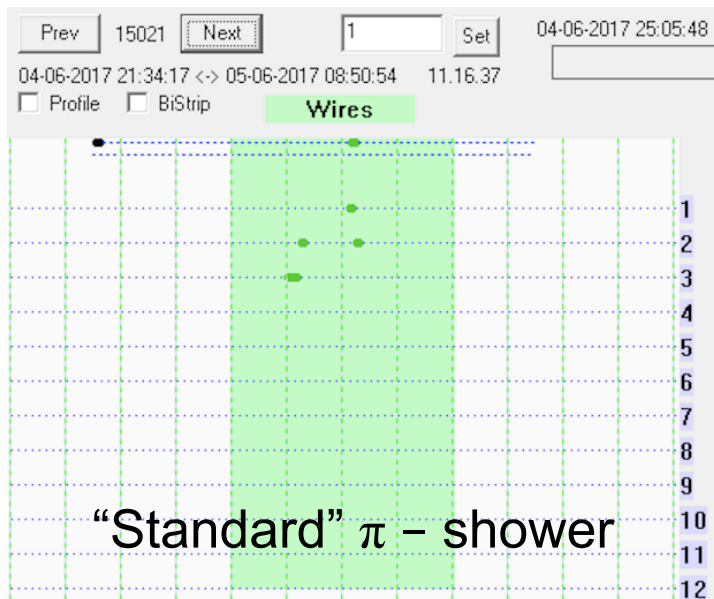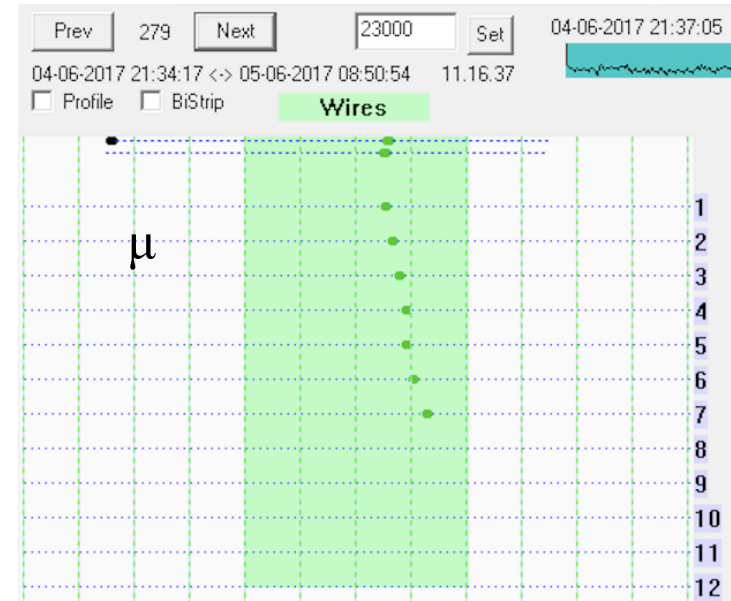Run 605   -0.5GeV/c   04.06.2017

All event (with e⁻)

event without e⁻ (μ + π)

grid = 1 ch/TDC = 123.063ps

ZOOM

Run 605   -0.5GeV/c   04.06.2017

All event (with e⁻)

event without e⁻ (μ + π)

grid = 1 ch/TDC = 123.063ps

PROTOTYPE DATA (μ vs π)

μ

μ

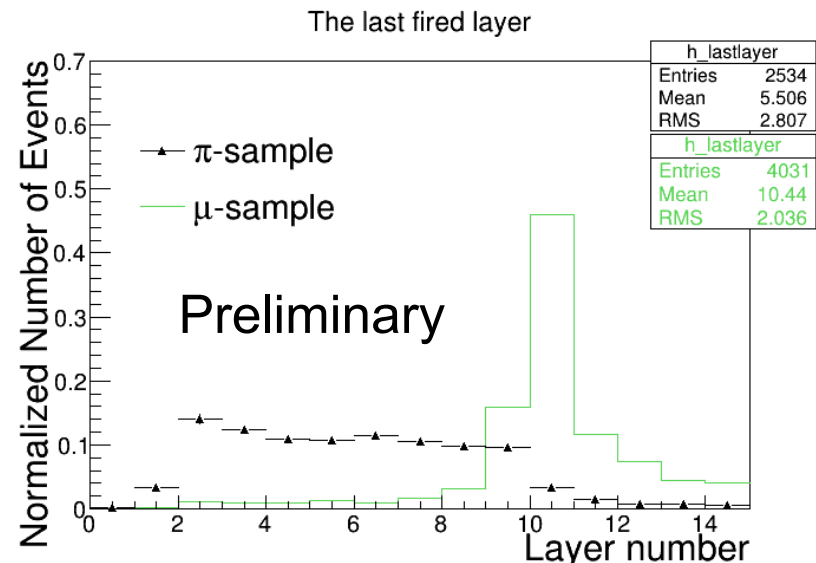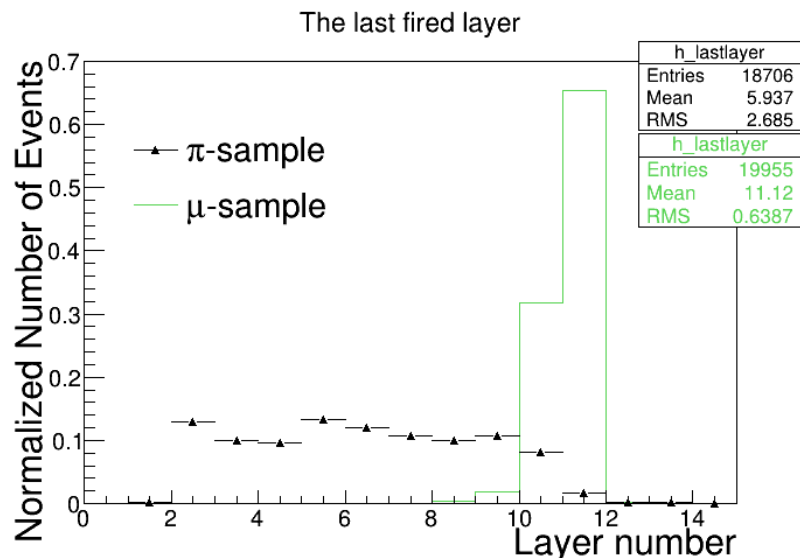"Standard" π – shower

"μ-like" π

11
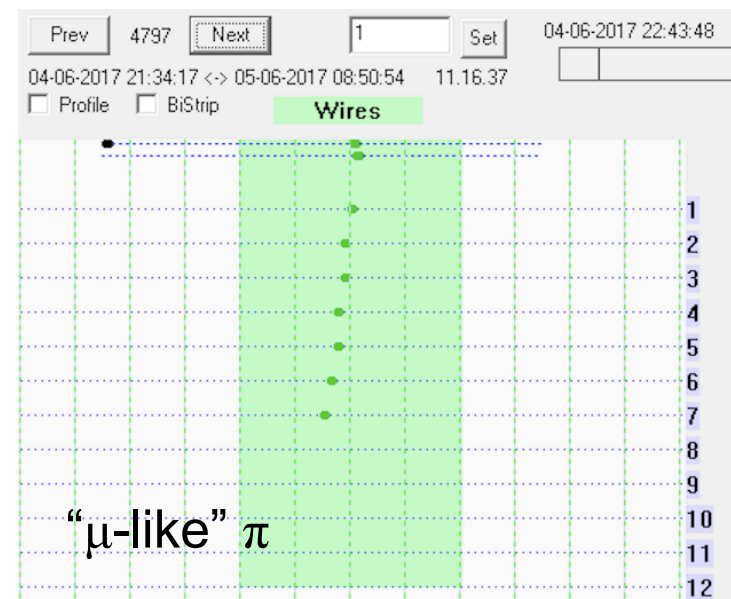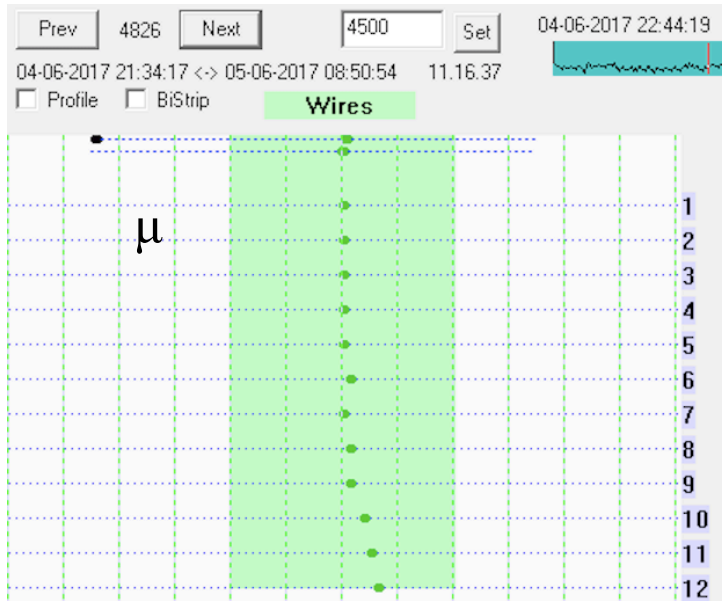
RESULTS FROM THE PROTOTYPE

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

P = 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.