

Beam monitoring in July STT test in Julich at COSY

protons with momenta 2.95, 0.8 and 0.6 GeV/c were provided by COSY team into Big Karl external beam line from 18.07.2014 to 25.07.2014.

beam tuning and monitoring from COSY control room, experimental counting room

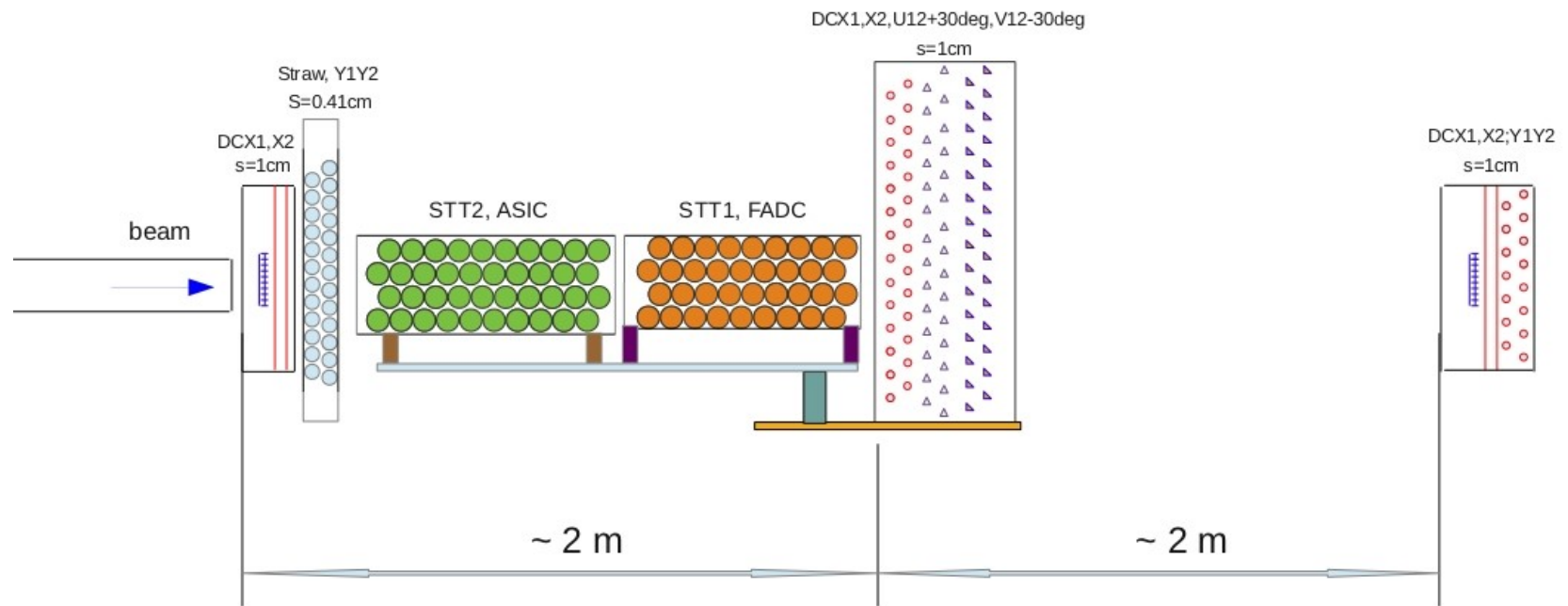
three stations of tracking detectors - DC, straw tubes in addition to STT1 and STT2

readout -CMP16 and F1 TDC, WASA ROOTSORTER and XML on-line interface

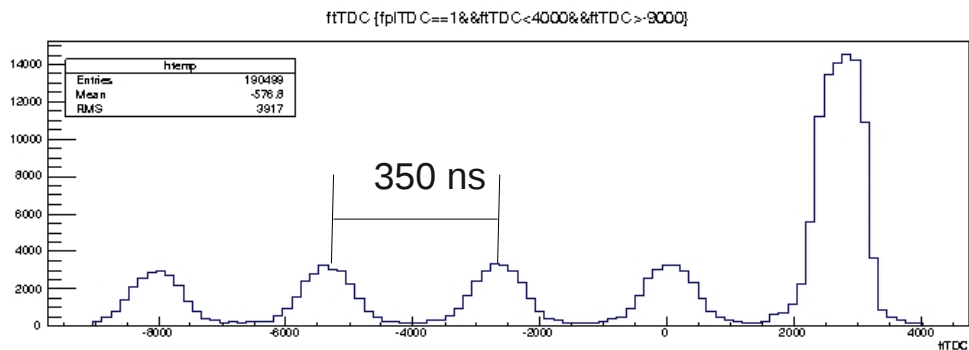
monitoring time spectra – beam time structure, channel multiplicities, beam shapes

Second delayed continuum in STT – FQDC, FPGA time spectra

Sketch of detector position in Big Karl

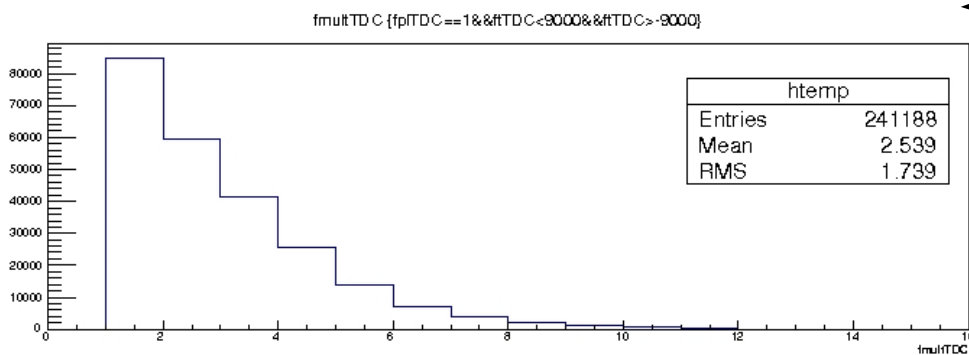


run 6082, 03.12.2011, 2.95 GeV/c, ~ 400 kHz/straw

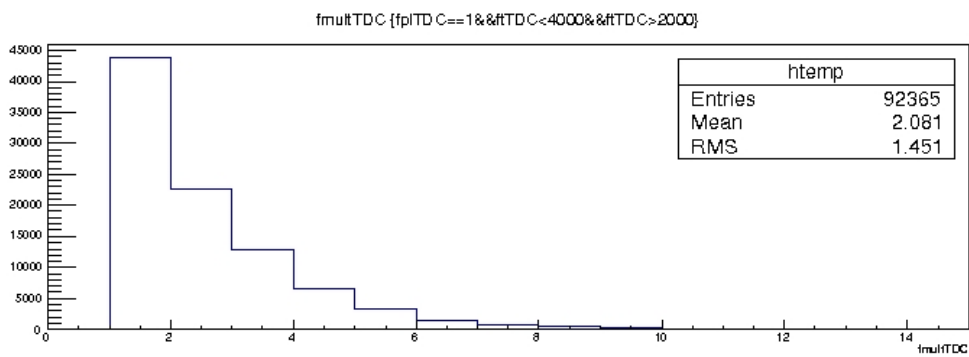


time structure in DC

time ←

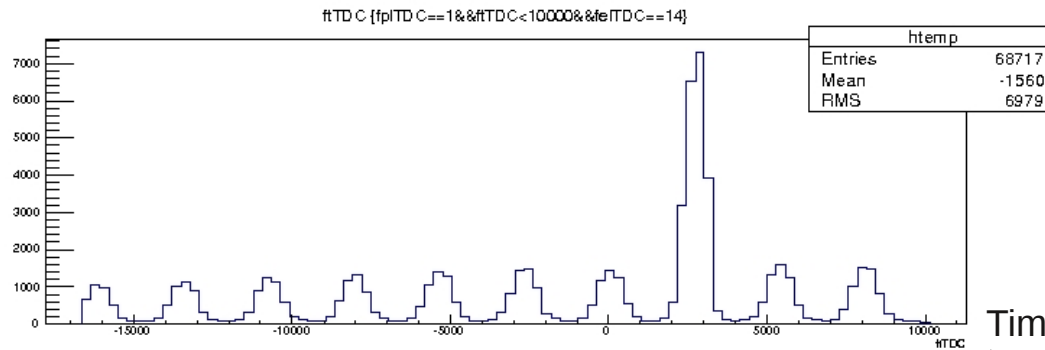


multiplicity in big window



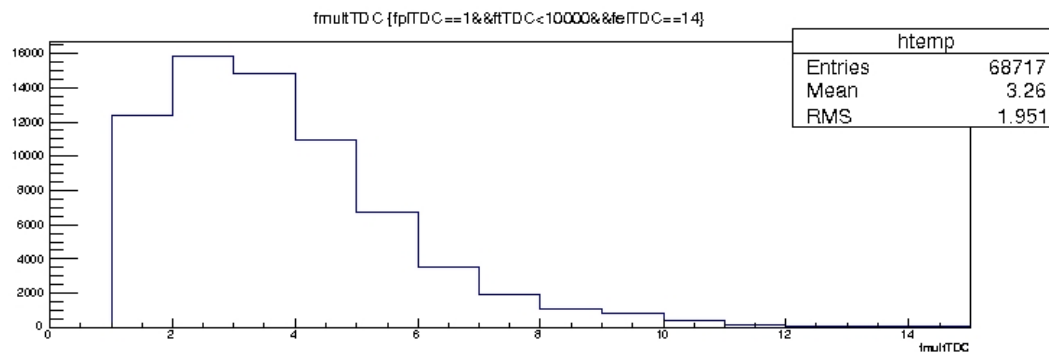
multiplicity in basic window

run6082, 03.12.2011, 2.95 GeV/c, ~ 400 kHz/straw

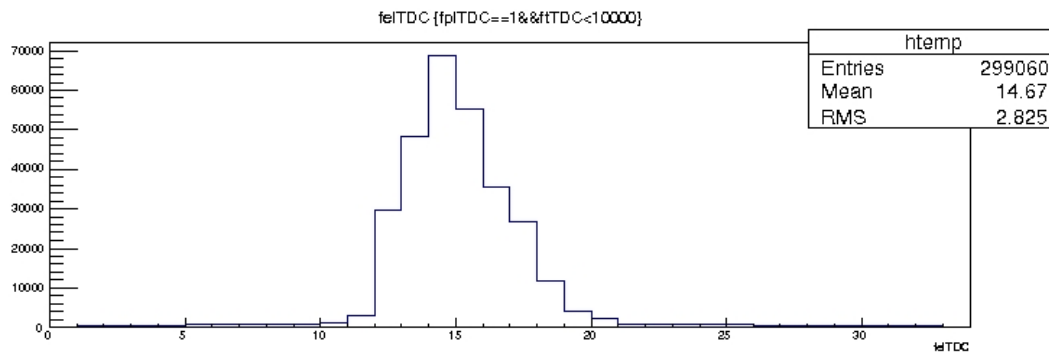


time structure in DC

Time, 0.13 ns

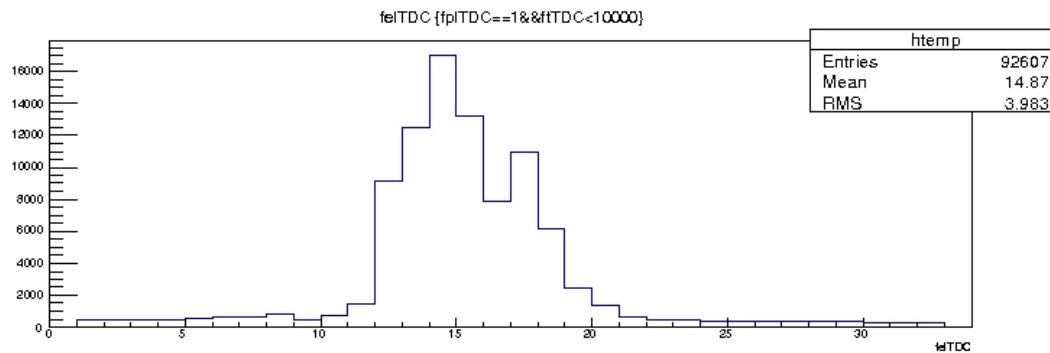
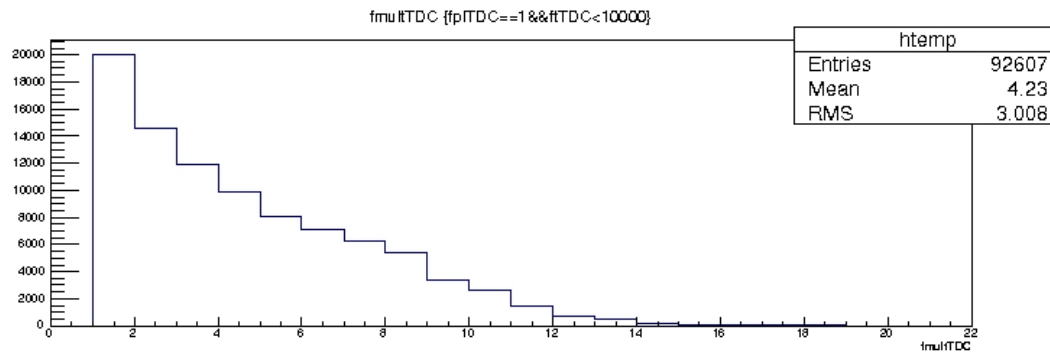
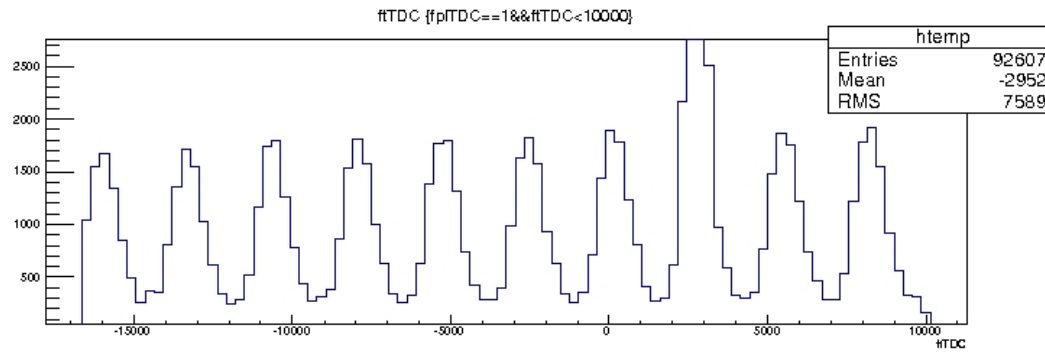


channel multiplicity
(central channel)



vertical beam profile, cm

run 6084, 03.12.2011, 2.95 GeV/c, ~ 2 MHz/straw

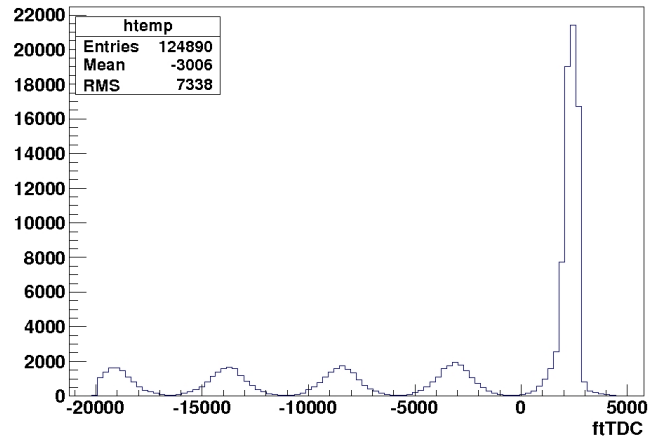


beam time structure in July 2014 COSY test

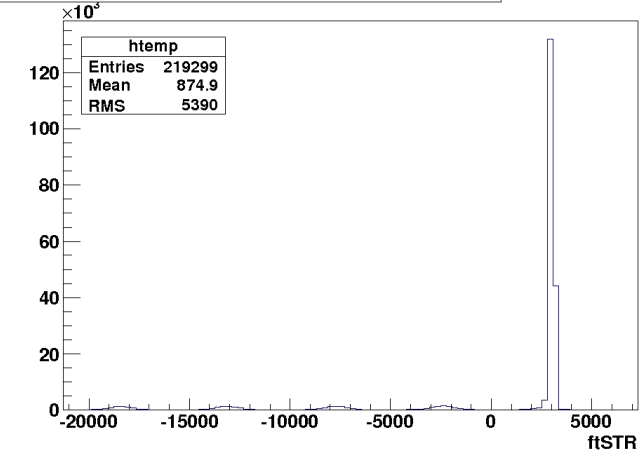
run9664, 19.07.2014, 2.95 GeV/c,
~ 10kHz, mult.~1.5

run9705, 20.07.2014, 2.95 GeV/c, mult.~1.15

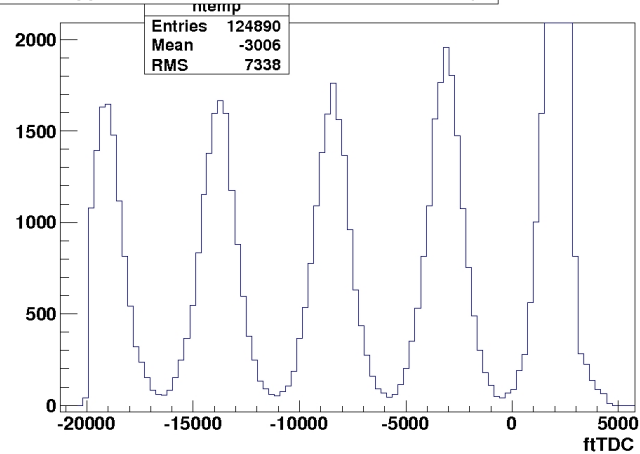
ftTDC {fpITDC==1&&ftTDC<4500&&ftTDC>-25000}



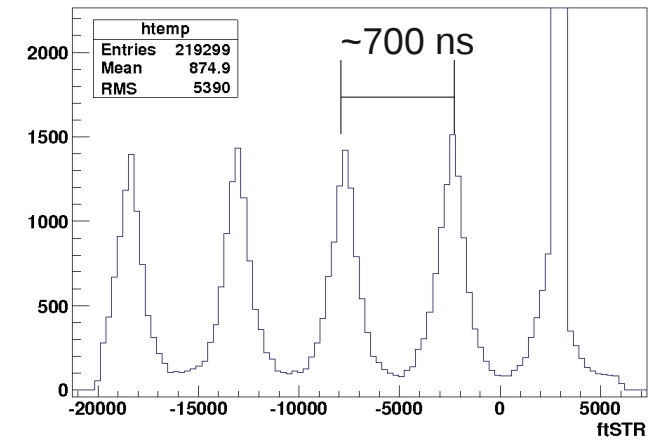
ftSTR {fpISTR==1&&ftSTR<6000&&ftSTR>-20000}



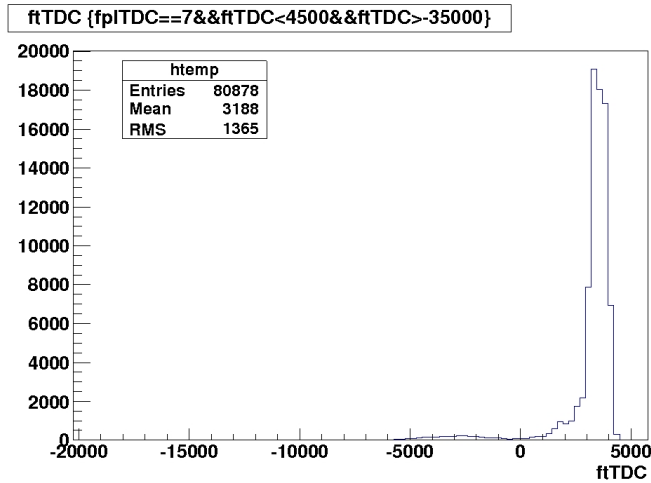
ftTDC {fpITDC==1&&ftTDC<4500&&ftTDC>-35000}



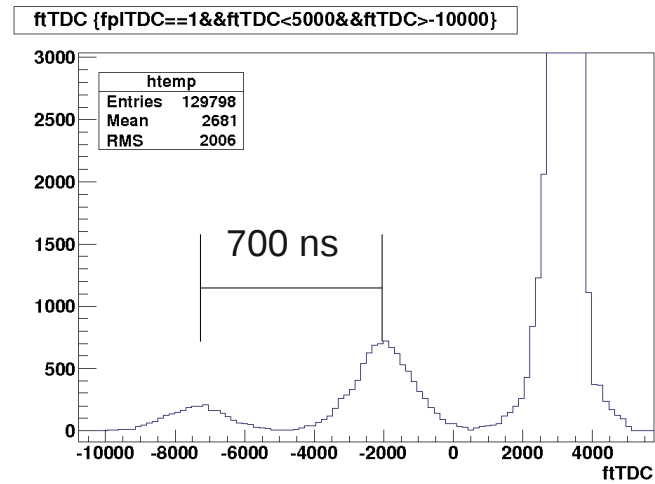
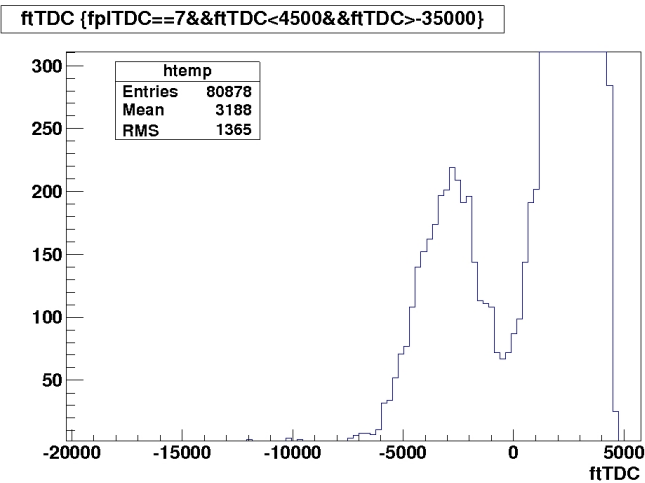
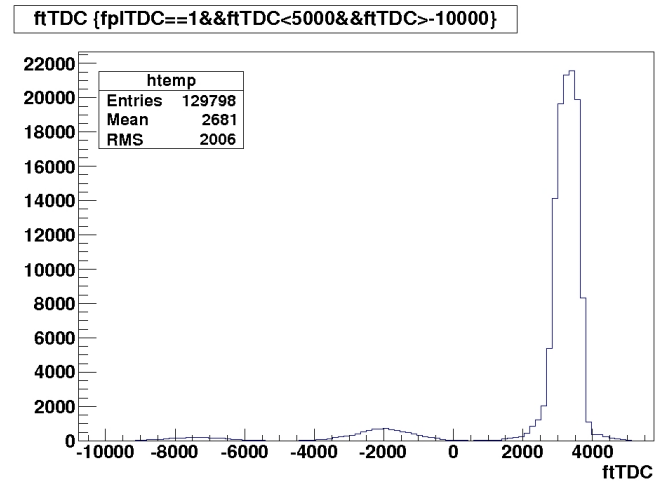
ftSTR {fpISTR==1&&ftSTR<6000&&ftSTR>-20000}



run9820, 22.07.2014, 0.8 GeV/c, ~ 500 kHz/straw, channel multiplicity ~ 1.04



run9941, 25.07.2014, 2.95 GeV/c, ~ 30 kHz/straw, channel multiplicity ~ 1.1

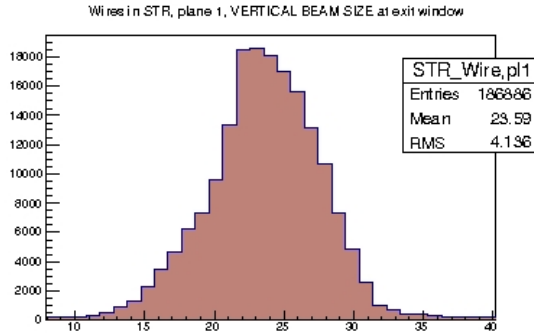


run9648, 2.95 GeV/c

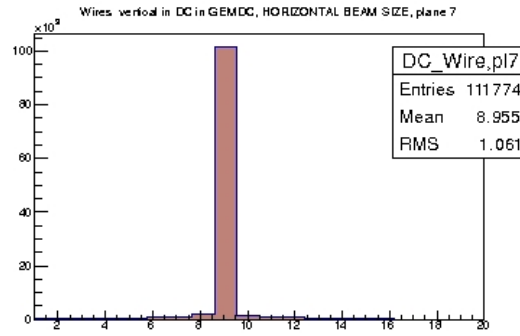
vertical

horizontal

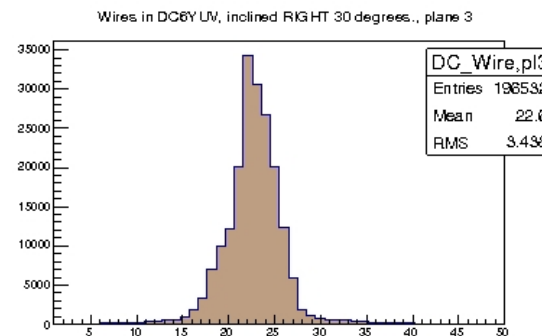
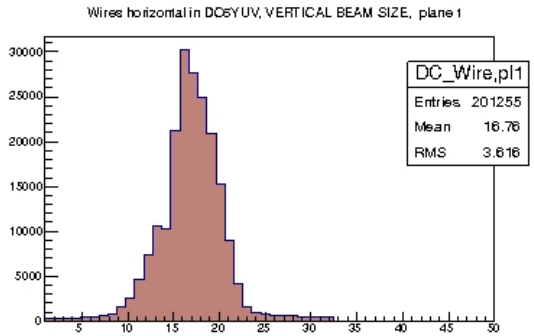
Pitch 0.41 cm
FWHM~3.7 cm



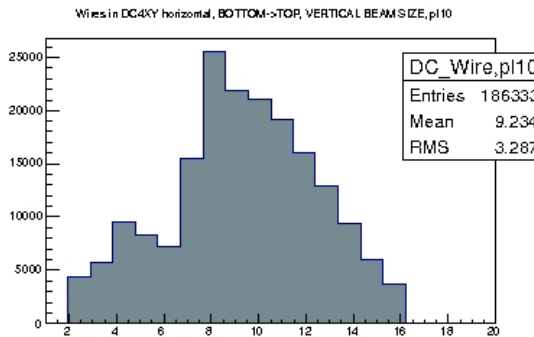
Pitch 1.0 cm
FWHM<1.0 cm



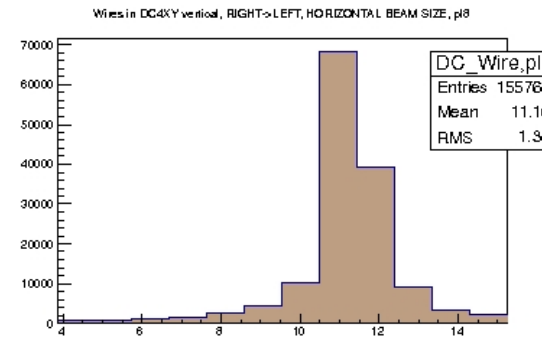
Pitch 1.0 cm
FWHM~5.0 cm



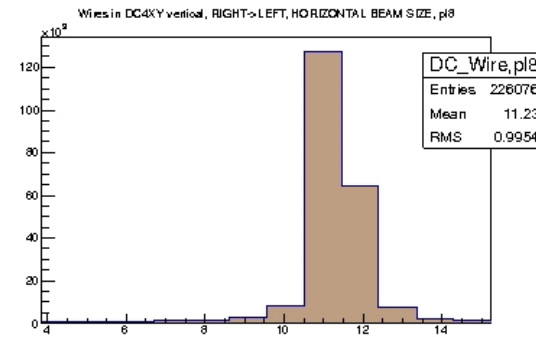
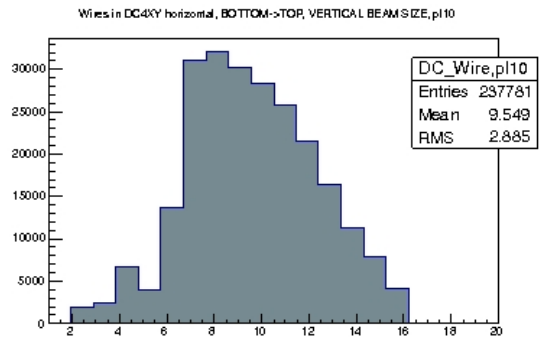
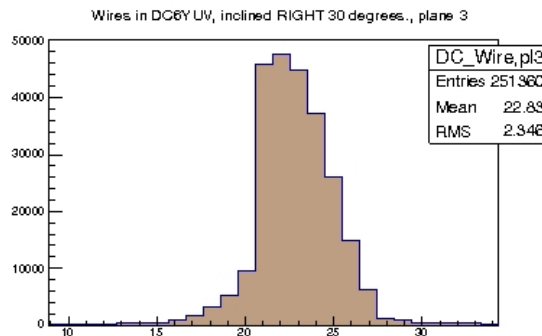
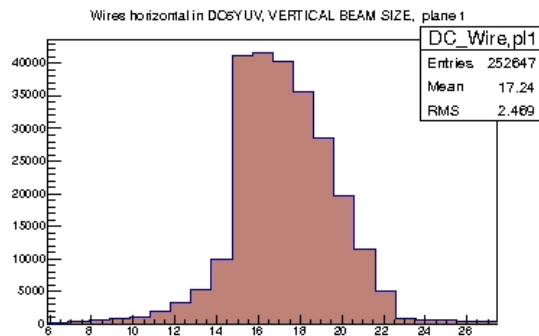
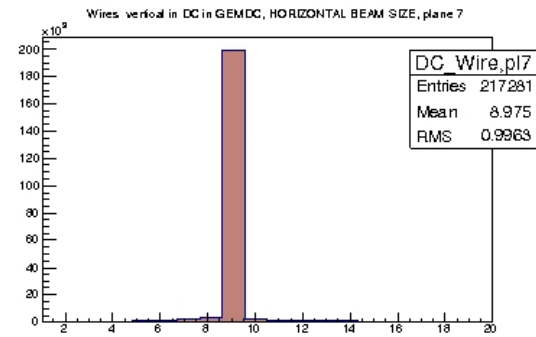
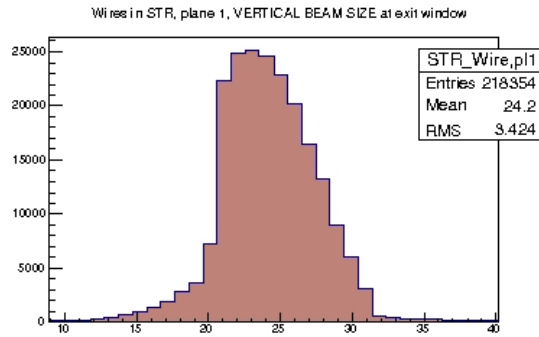
Pitch 1.0 cm
FWHM~7.0 cm



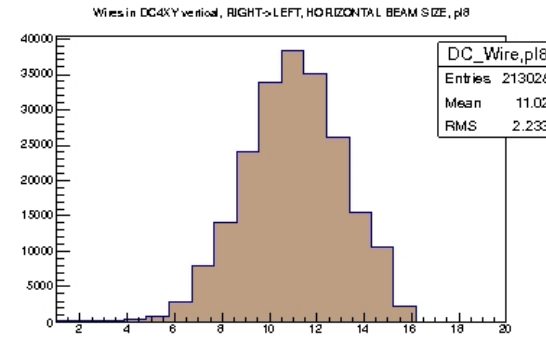
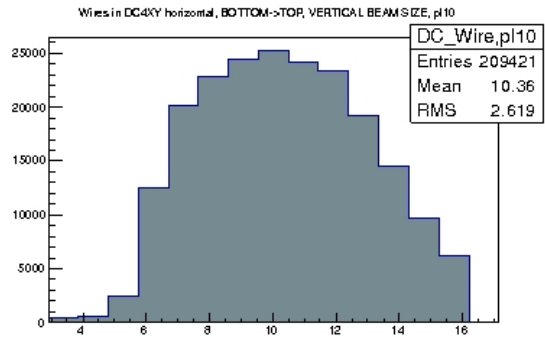
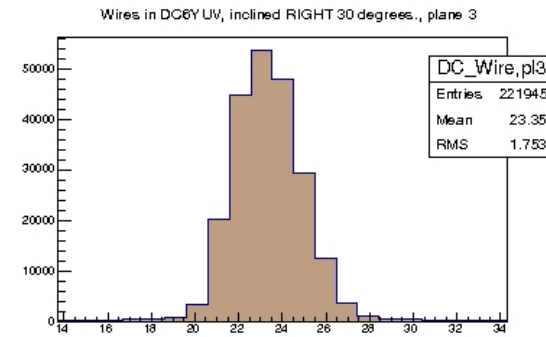
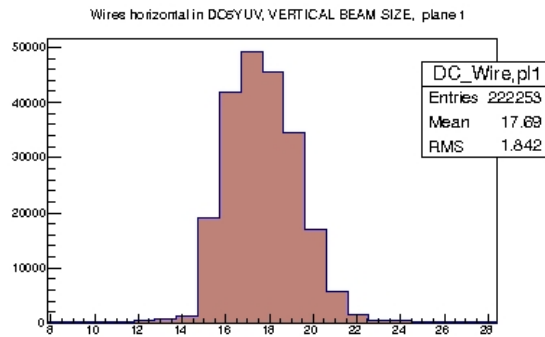
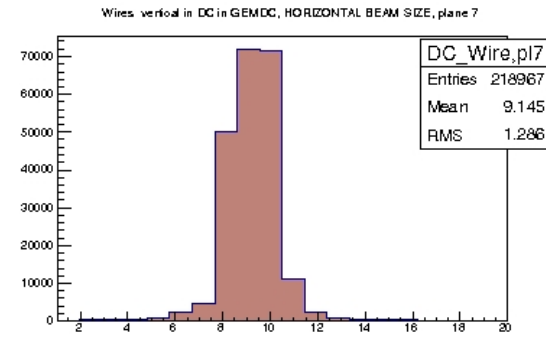
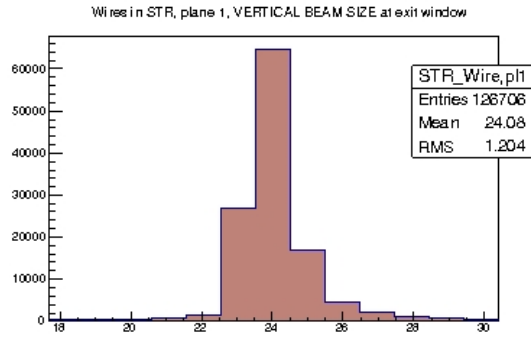
Pitch 1.0 cm
FWHM<2.0 cm



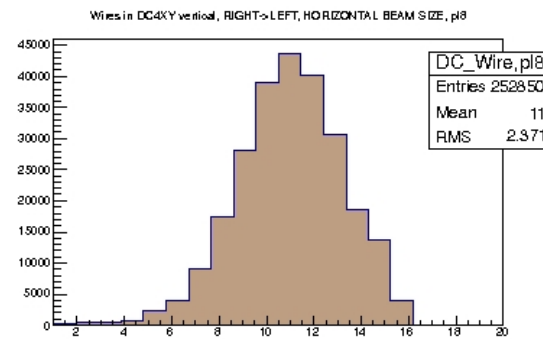
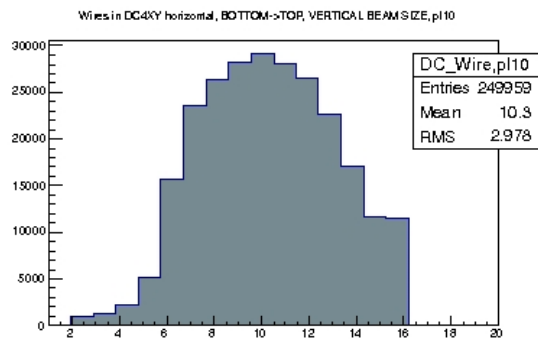
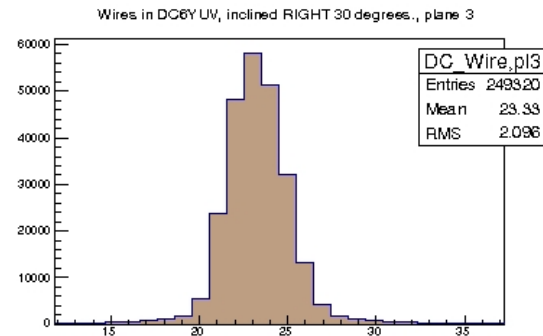
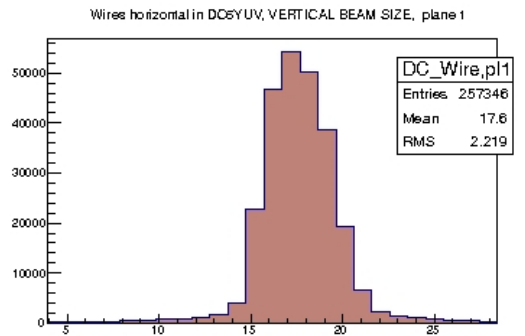
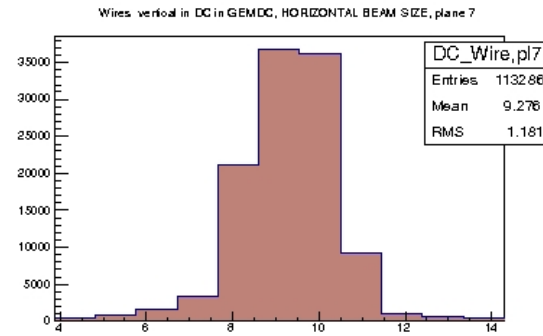
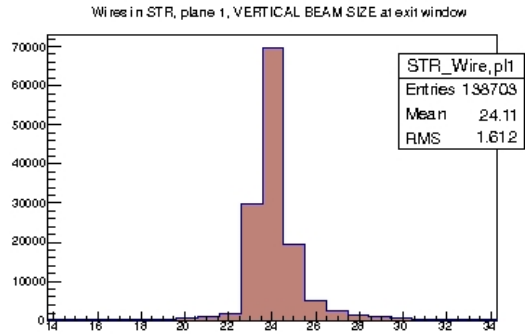
run9705, 2.95 GeV/c



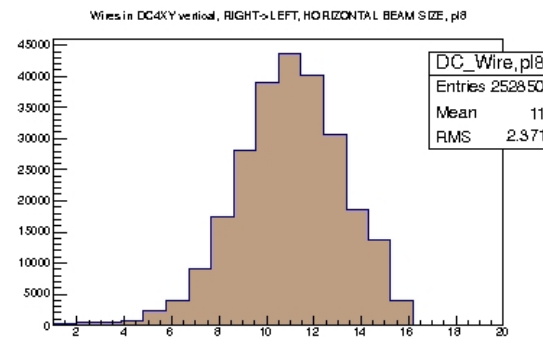
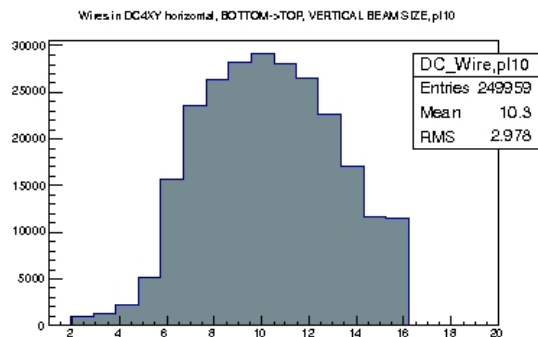
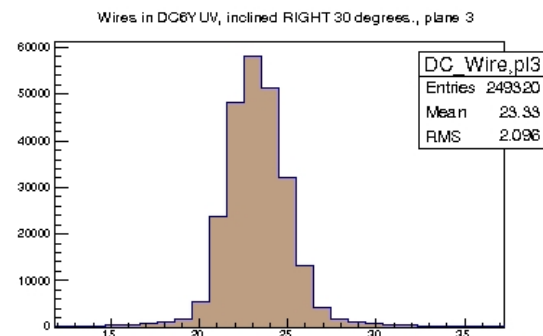
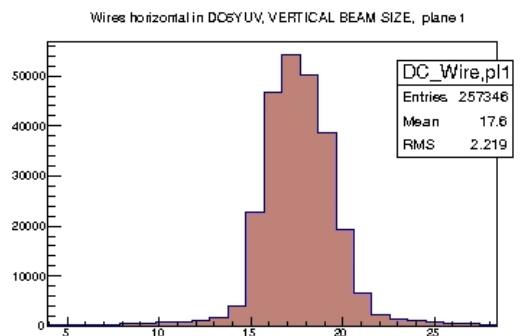
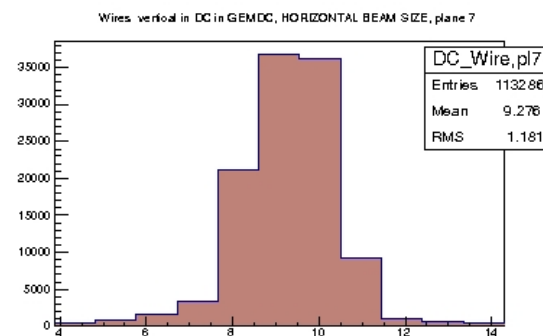
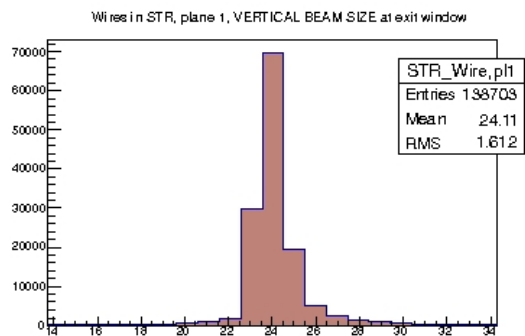
Run 9748, 0.8 GeV/c



run9837, 0.8 GeV/c



run9837, 0.8 GeV/c

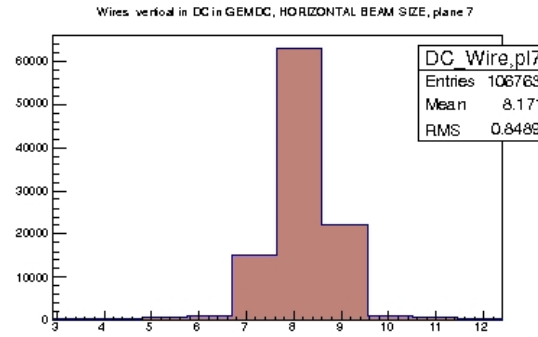
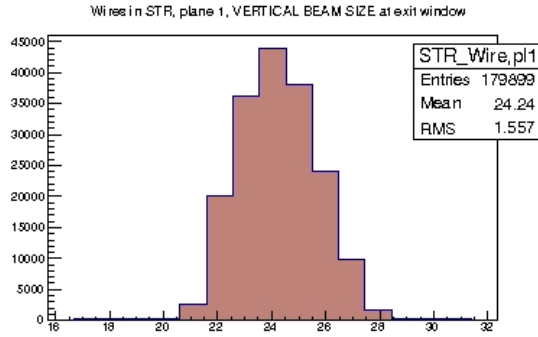


run9857, 0.6 GeV/c, divergence horizontal~ 12mrad, vertical~9 mrad

vertical

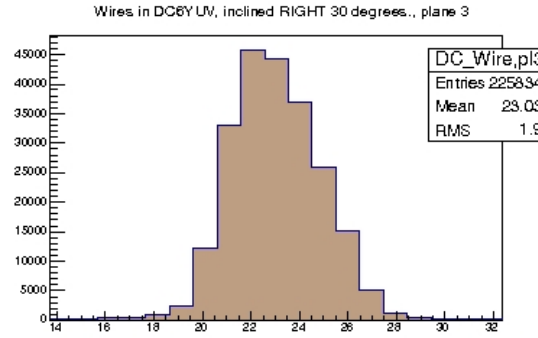
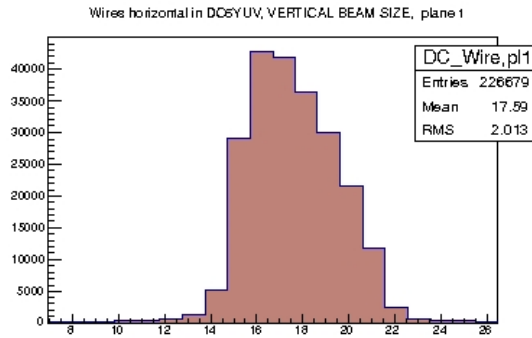
horizontal

Pitch 0.41 cm
FWHM~1.4 cm

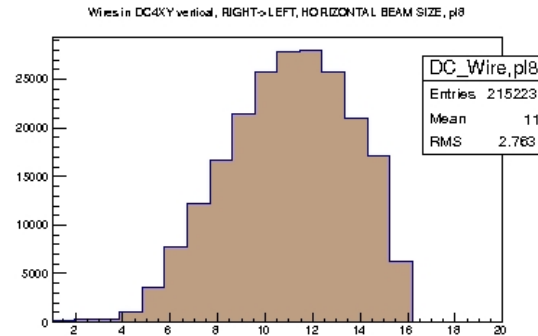
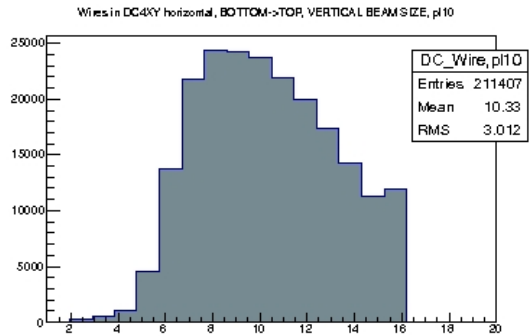


Pitch 1.0 cm
FWHM<~1 cm

Pitch 1.0 cm
FWHM~5 cm



Pitch 1.0 cm
FWHM~11 cm



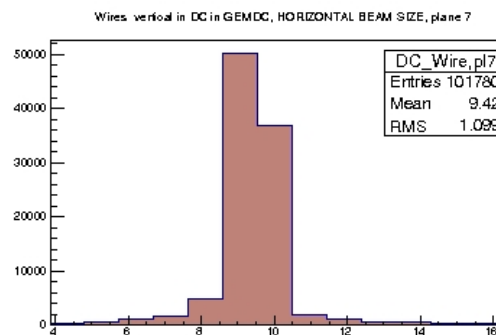
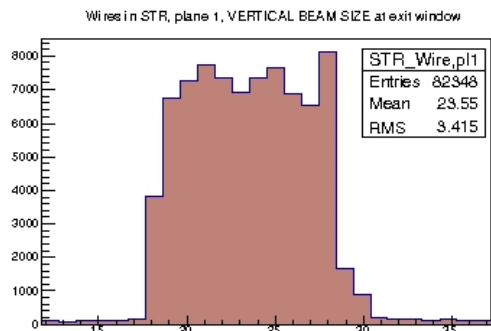
Pitch 1.0 cm
FWHM~8 cm

run9909, 2.95 GeV/c

vertical

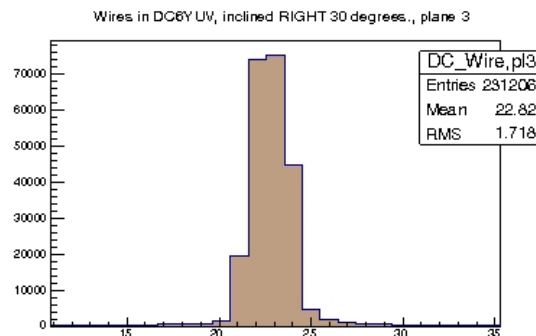
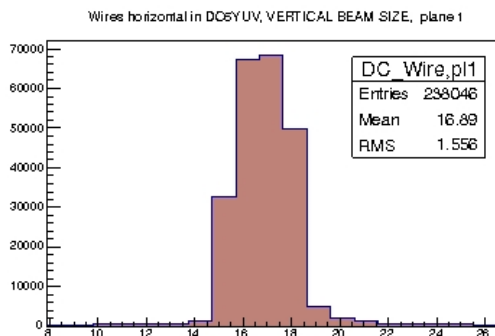
horizontal

Pitch 0.41 cm
FWHM~4.5 cm

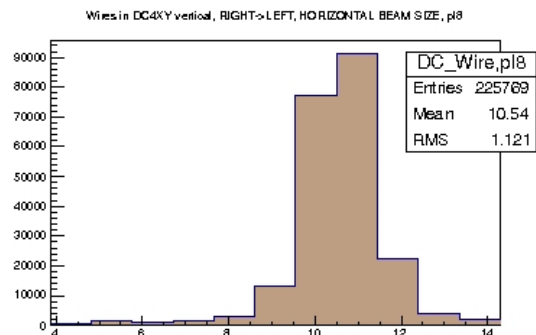
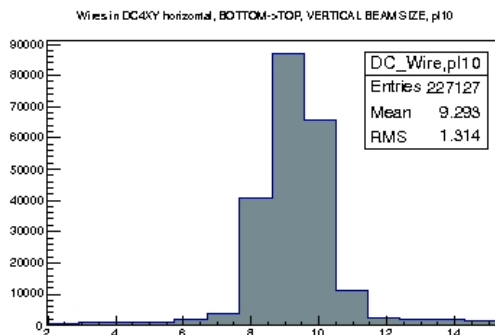


Pitch 1.0 cm
FWHM~2.0 cm

Pitch 1.0 cm
FWHM~3.5 cm



Pitch 1.0 cm
FWHM~3.0 cm



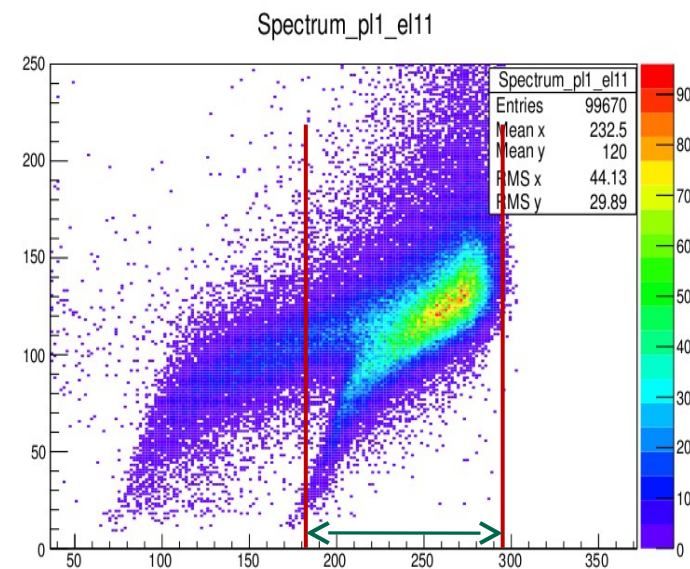
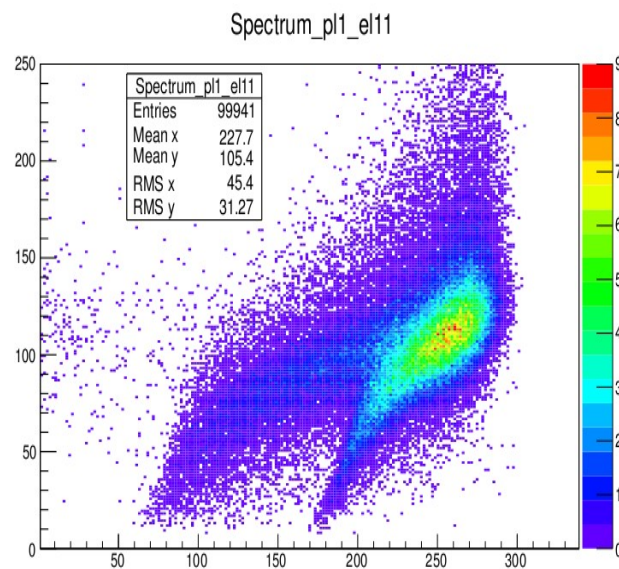
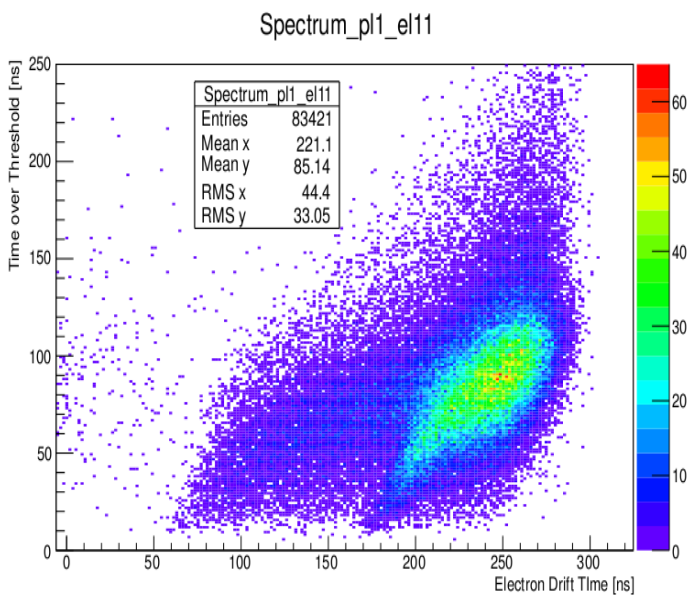
Pitch 1.0 cm
FWHM~2.0 cm

- ToT vs Drift Time plot made for plane 1 and channel 11
- 130 ns max-drift time expected from Garfield simulations
- 2 structure emerge in TOT for $> T_{\text{drift}} > 100$ ns (pile-up?)
- Data for 0.9 GeV/c low intensity [1700 V left to 1800 V right]
- With the increase of HV one can see that the double structure starts to be more visible

1700 V

1750 V

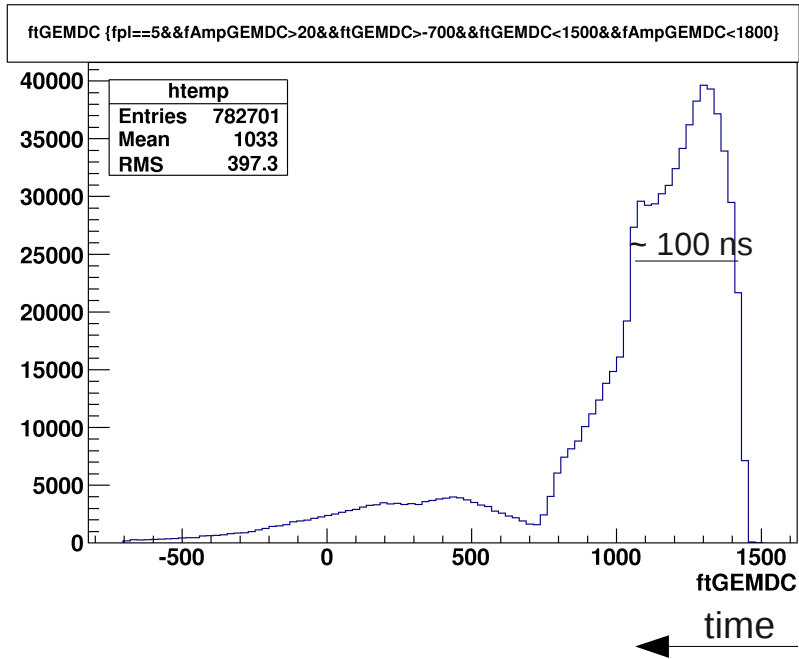
1800 V



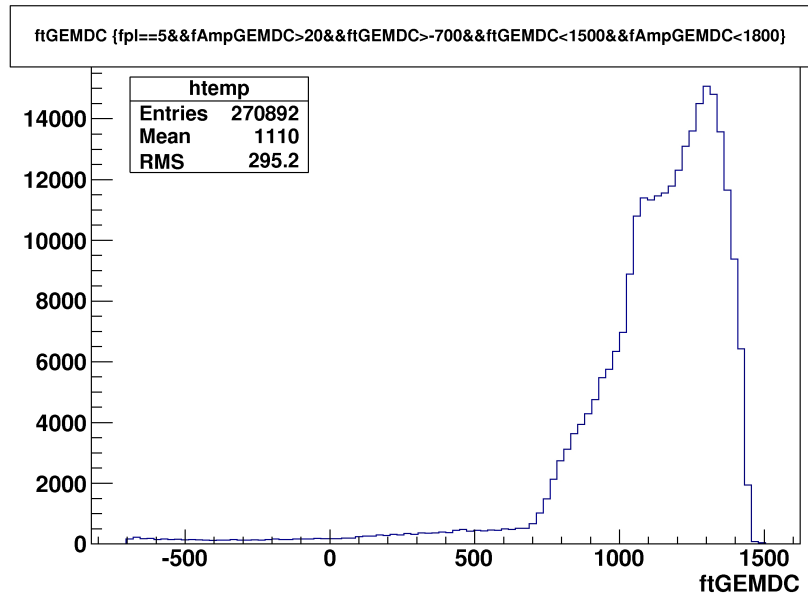
$\Delta T \sim 120$ ns

FQDC (FPGA) time spectrum

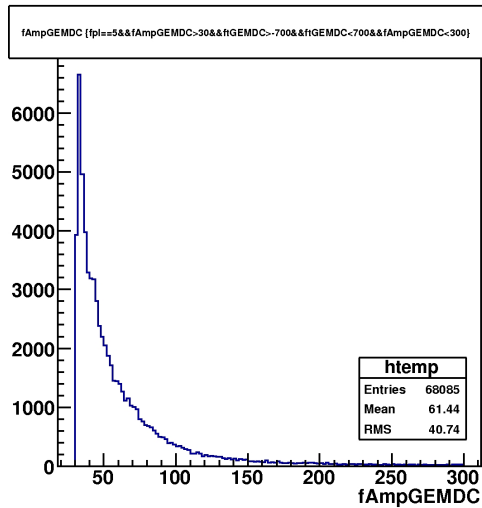
run9705, 1.85 kV, 2.95 GeV/c



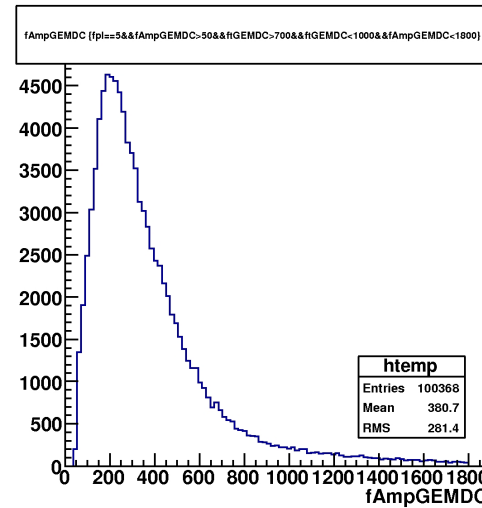
run9709, 1.75 kV, 2.95 GeV/c



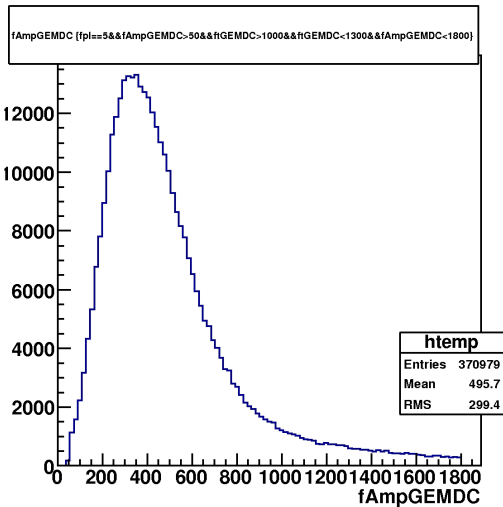
run9705, 1.85 kV, 2.95 GeV/c, amplitudes – different time windows



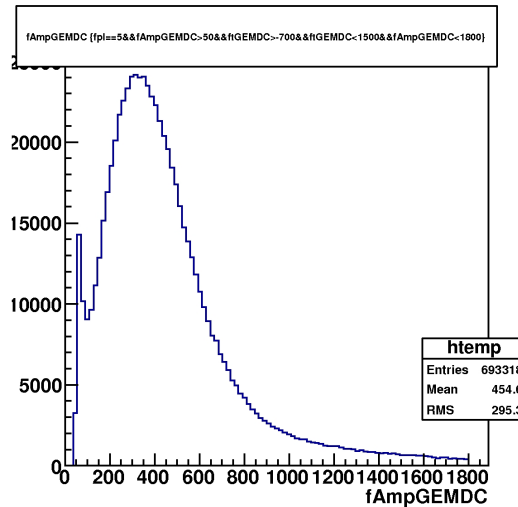
-700<t<700



700<t<1000

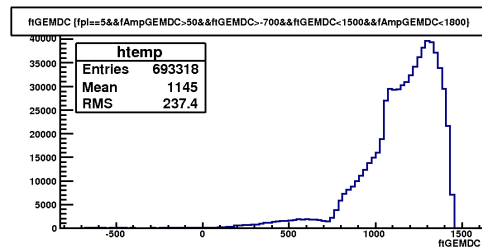
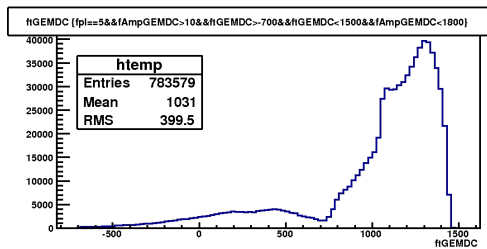


1000<t<1300



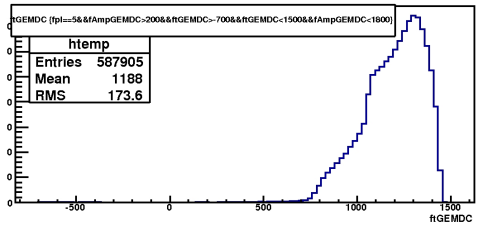
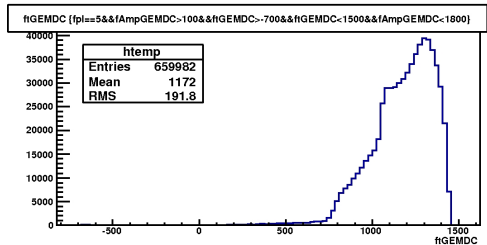
-700<t<1500

run9705, 1.85 kV, 2.95 GeV/c, times – cut on amplitudes, FQDC pulse number



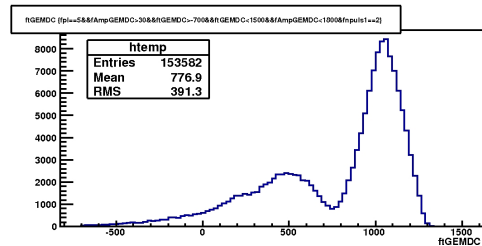
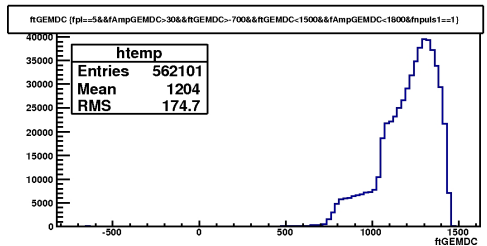
amp>10

amp>50



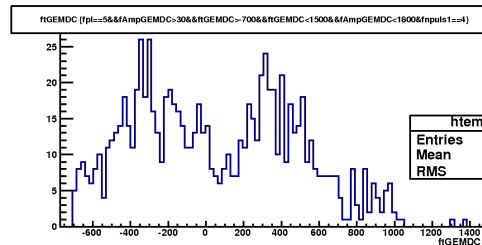
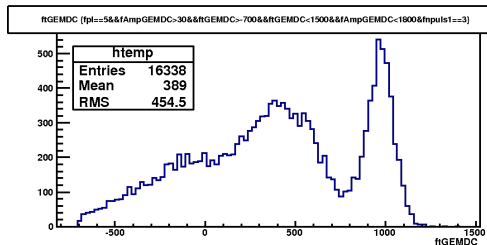
amp>100

amp>200



pulse1

pulse2



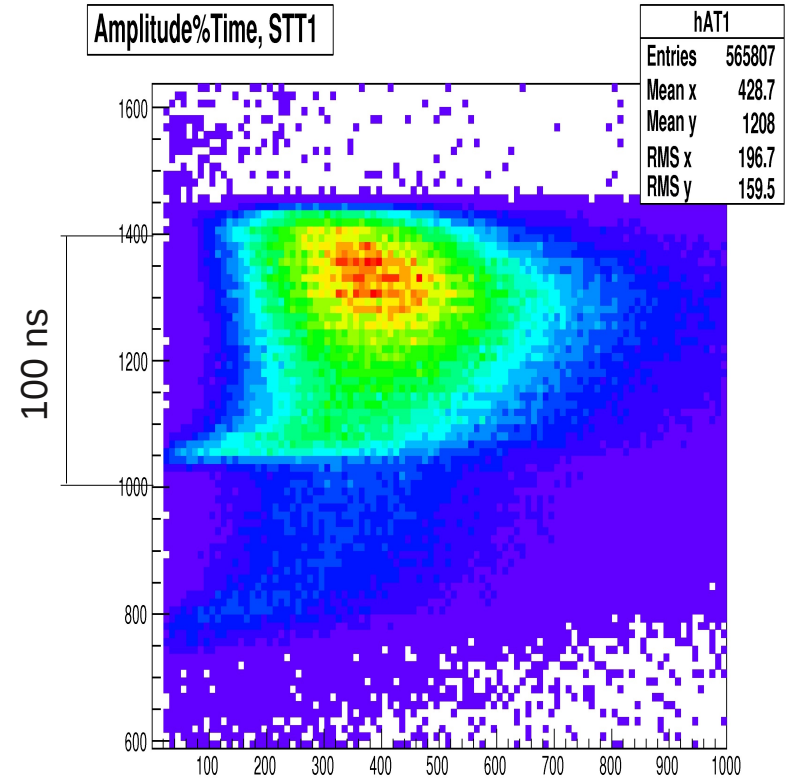
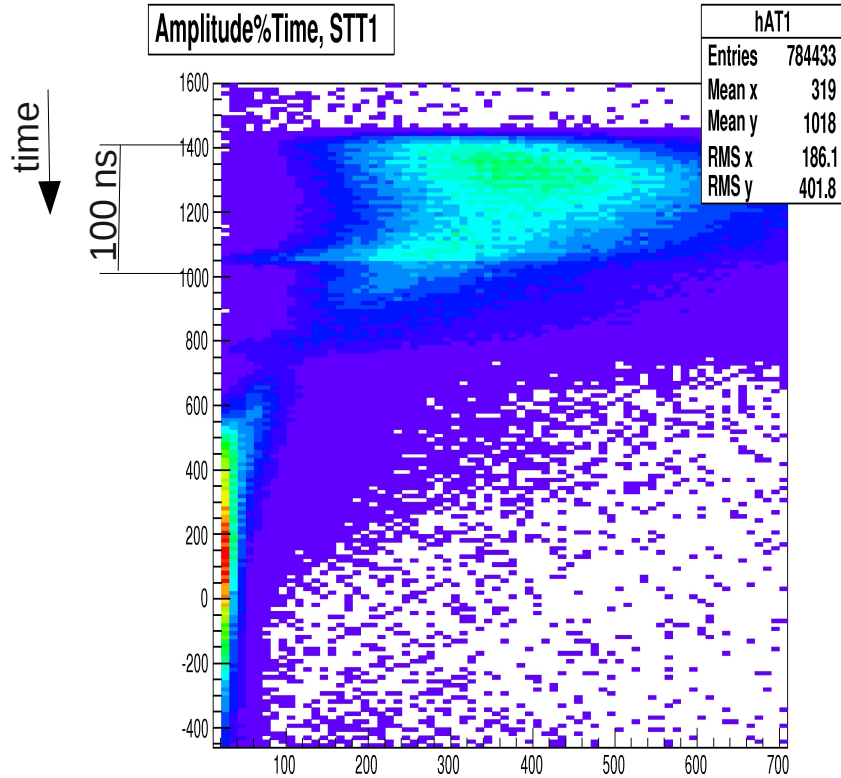
pulse3

pulse4

run9705, 1.85 kV, 2.95 GeV/c, time versus amplitudes

all pulses

1st pulse



FQDC amplitude

Summary

on-line monitoring of the beam profiles, timing, multiplicities using external gas coordinate detectors

histogram control, no tracking yet ← needs precise knowledge of the detector positions

could be used off-line qualitatively during beam data analysis

detector positions measurements can be done by the next beam time (October, 2014) → a common tracking can be realized for the STT readout in F1 crate with FQDC

Second delayed continuum in STT time spectra

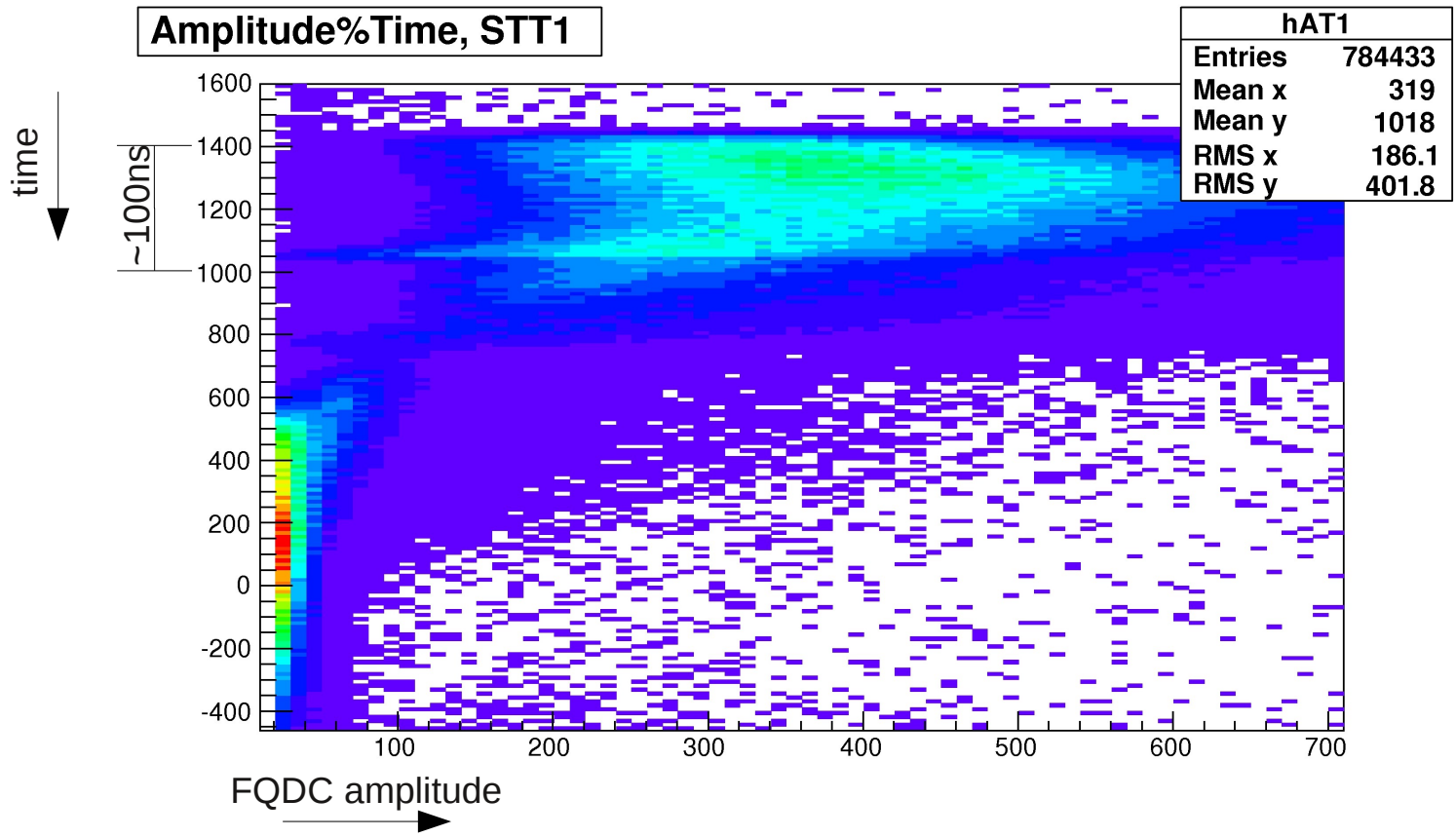
strong dependence on H.V.

only secondary pulses, accompanies the basic pulse from track

small amplitude → single photoelectrons

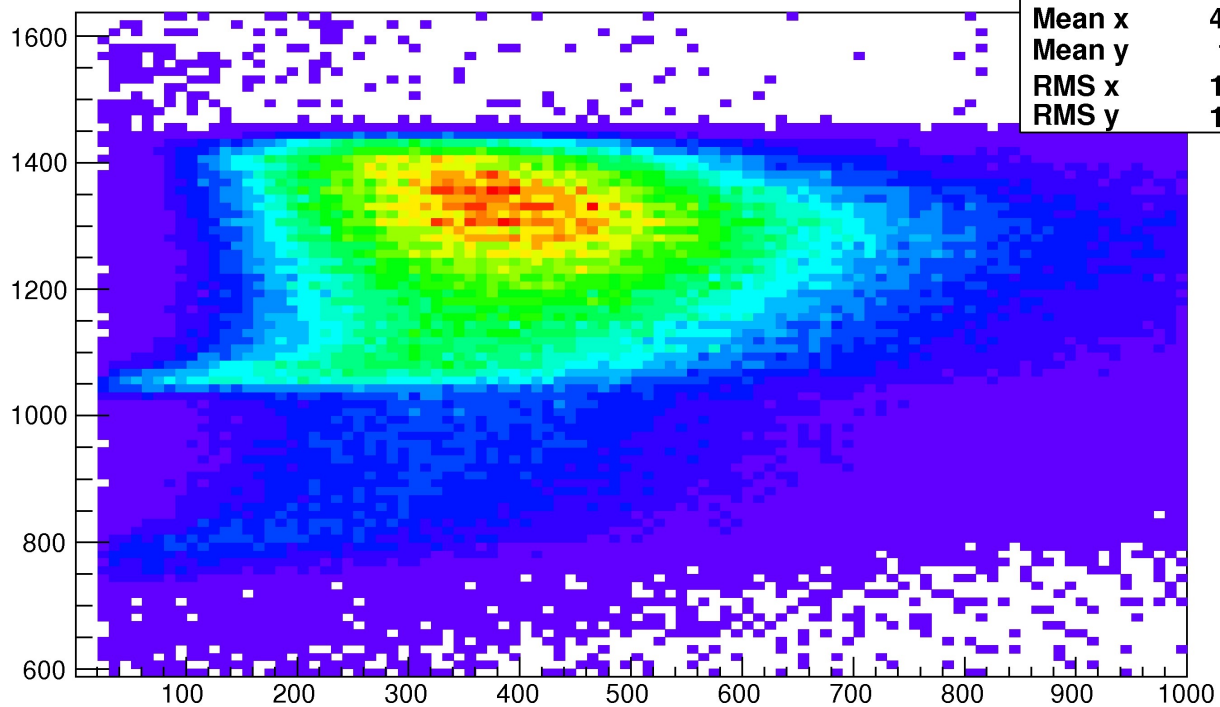
no essential dependence on beam momentum and intensity

run9705, 1.85 kV, 2.95 GeV/c, time versus amplitudes, all pulses



run9705, 1.85 kV, 2.95 GeV/c, time versus amplitudes, 1st pulse

Amplitude%Time, STT1



hAT1	
Entries	565807
Mean x	428.7
Mean y	1208
RMS x	196.7
RMS y	159.5