

Pass0 Analysis: SVT Hits and Timing II

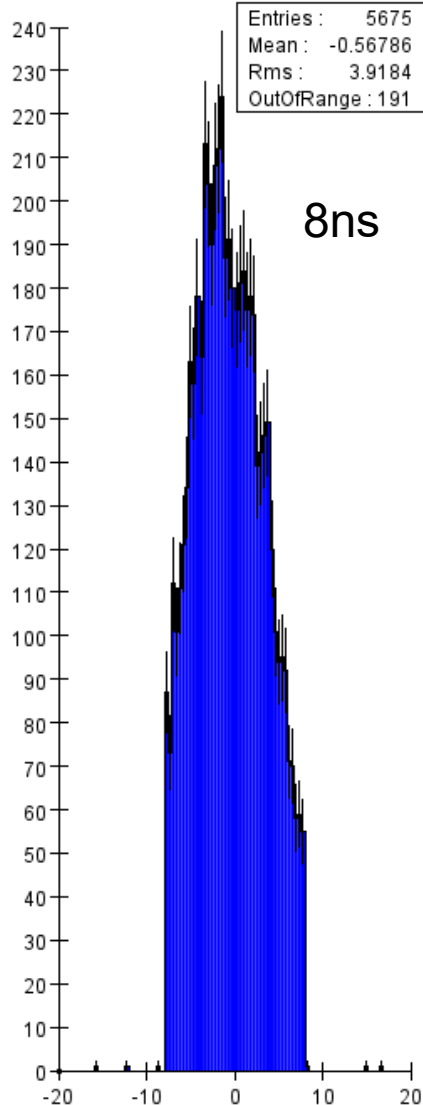
Norman Graf (SLAC)
Reconstruction / Analysis Meeting
April 4, 2023

SVT Hits and Timing Data

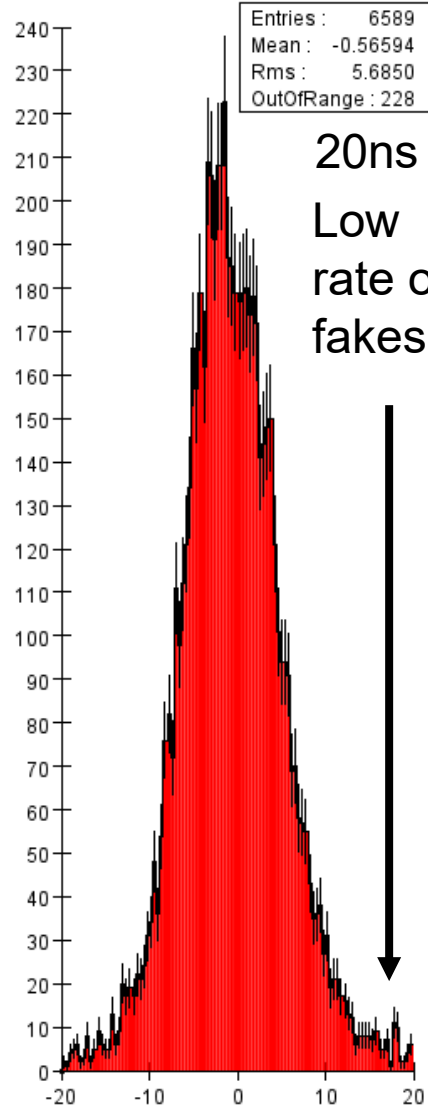
- Previous talk demonstrated that the 8ns timing cut in the strip-clustering was too aggressive
- Reconstruct some 2019 data using default value of 8ns and also with a looser cut of 20ns
 - batch farm was experiencing hardware issues, so only reconstructed one set of skims, 10104 bottom FEE
- Compare output

Two-strip Cluster δ Hit Times Layer 1

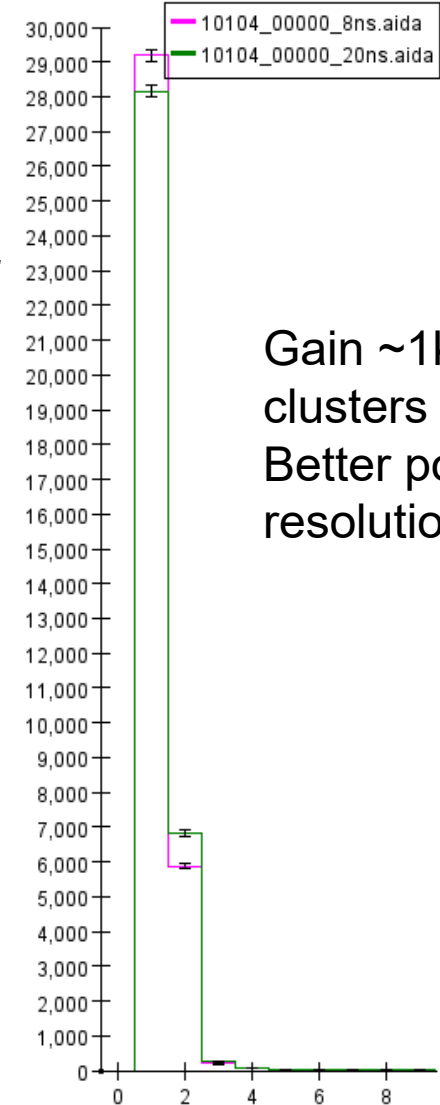
module_L1b_halfmodule_axial_sensor0 str...



module_L1b_halfmodule_axial_sensor0 str...

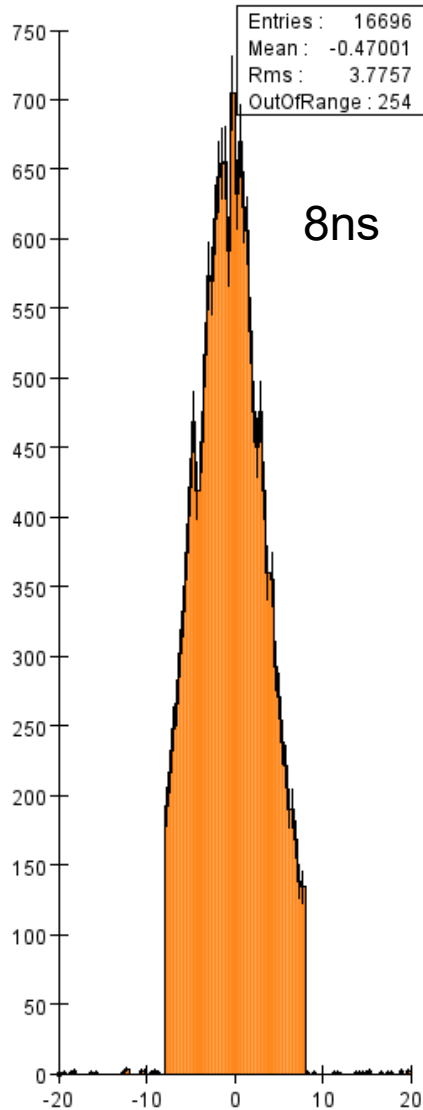


FinalStateParticles_KF - kf electron - modul...

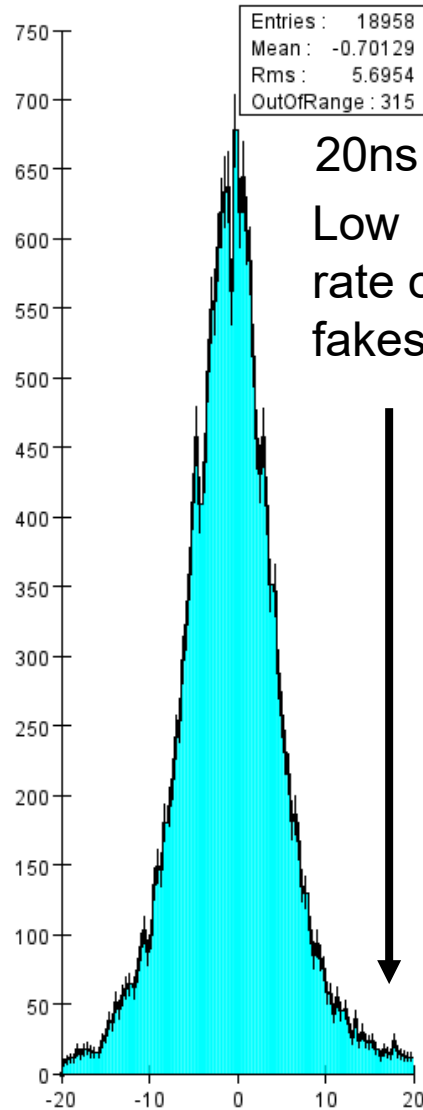


Two-strip Cluster δ Hit Times Layer 7

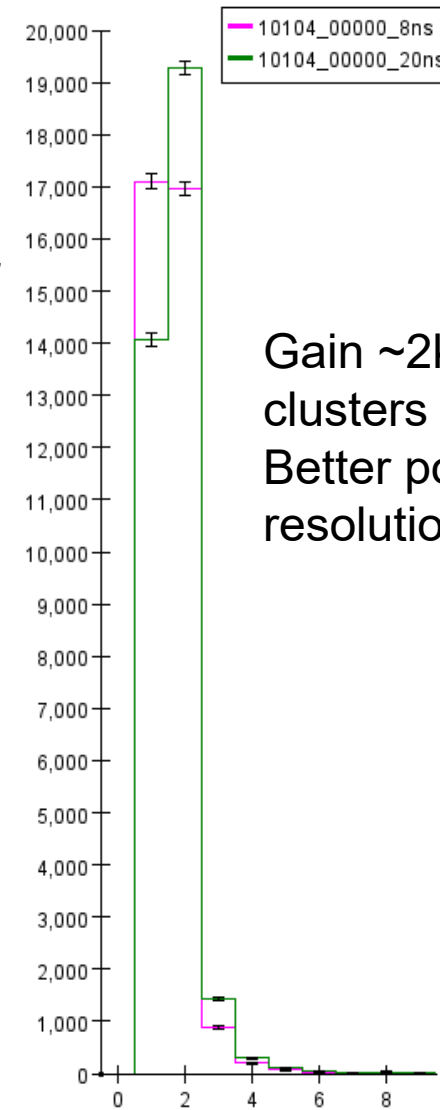
module_L7b_halfmodule_axial_hole_sens...



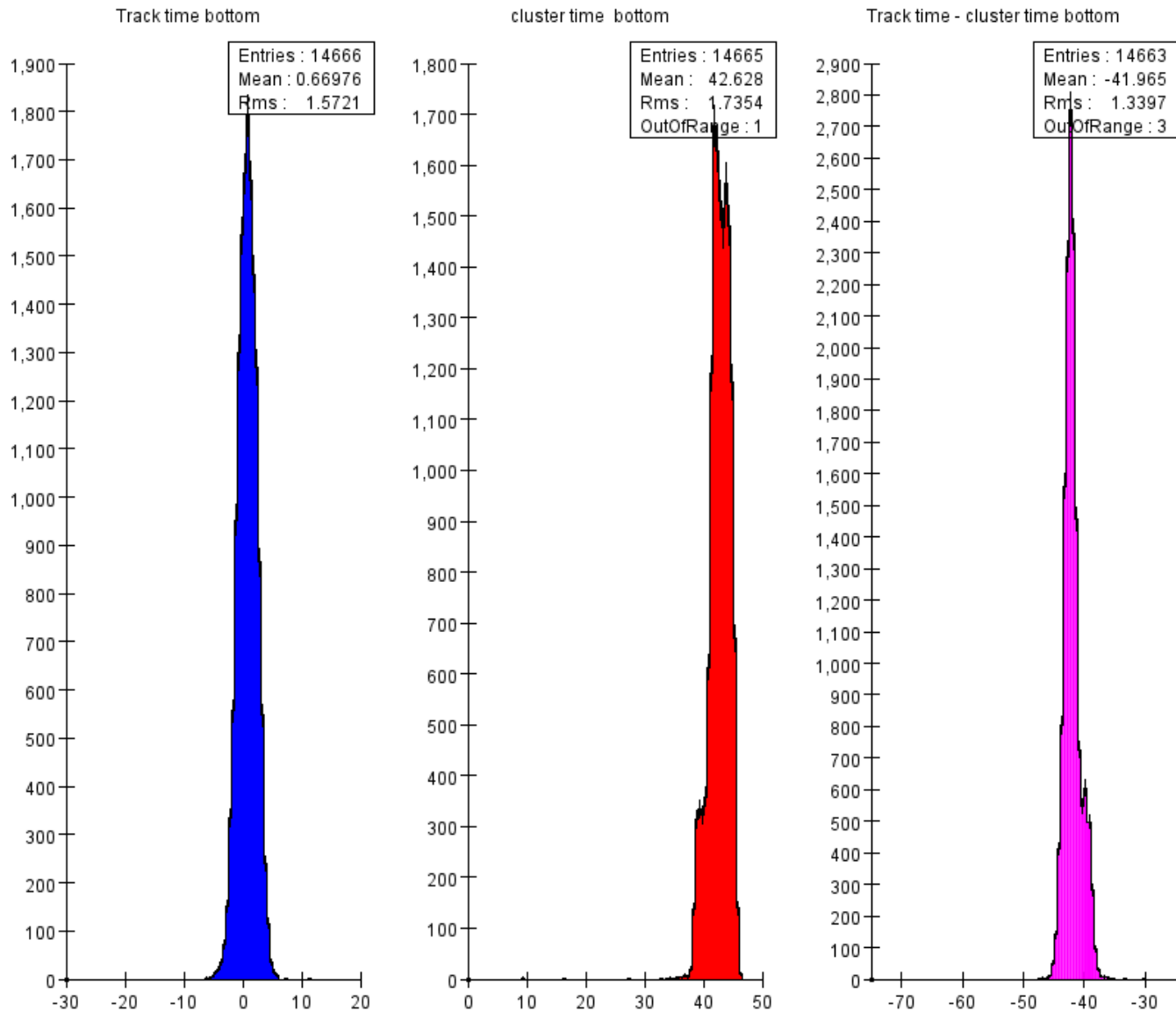
module_L7b_halfmodule_axial_hole_sens...



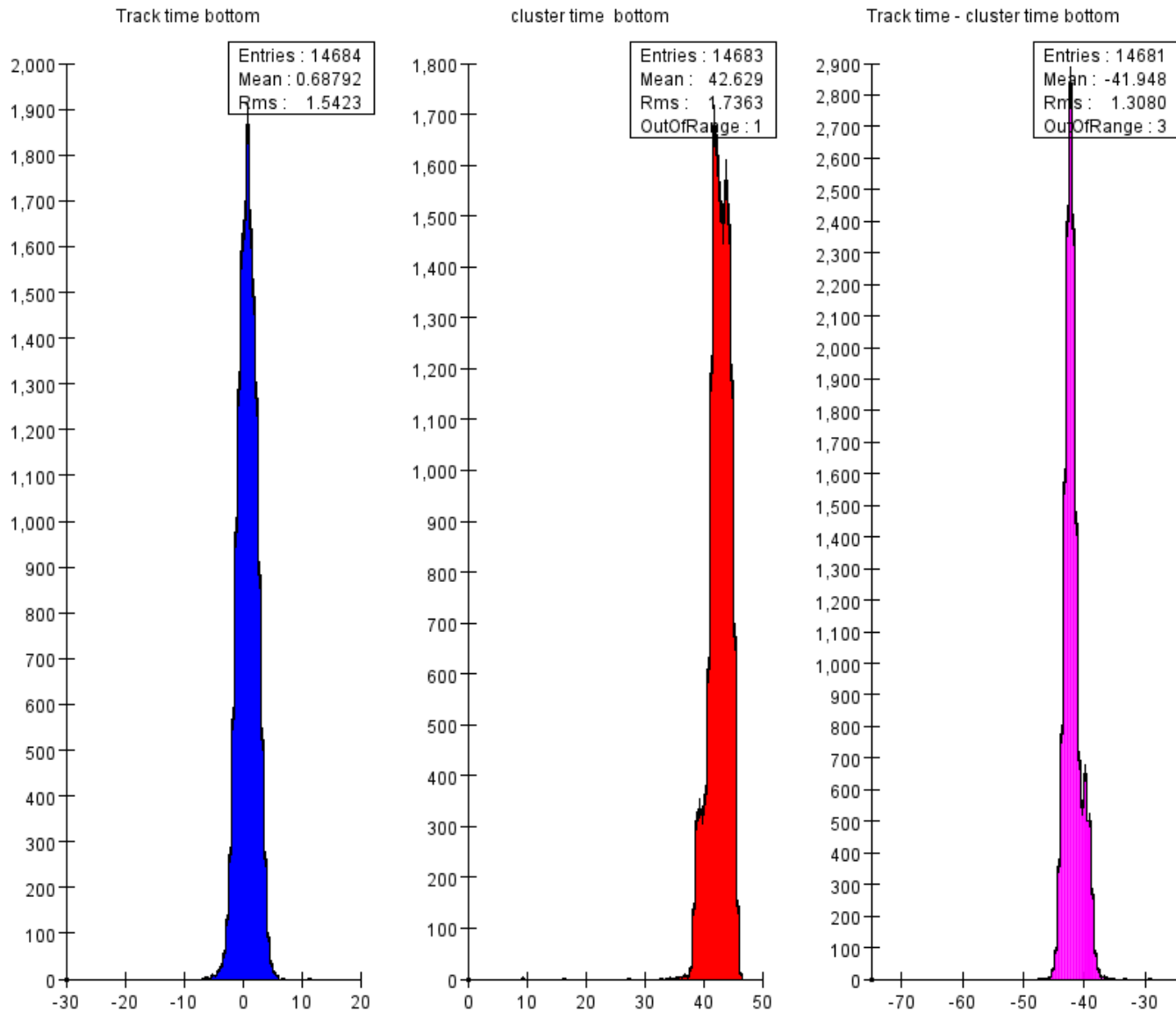
FinalStateParticles_KF - kf electron - modul...



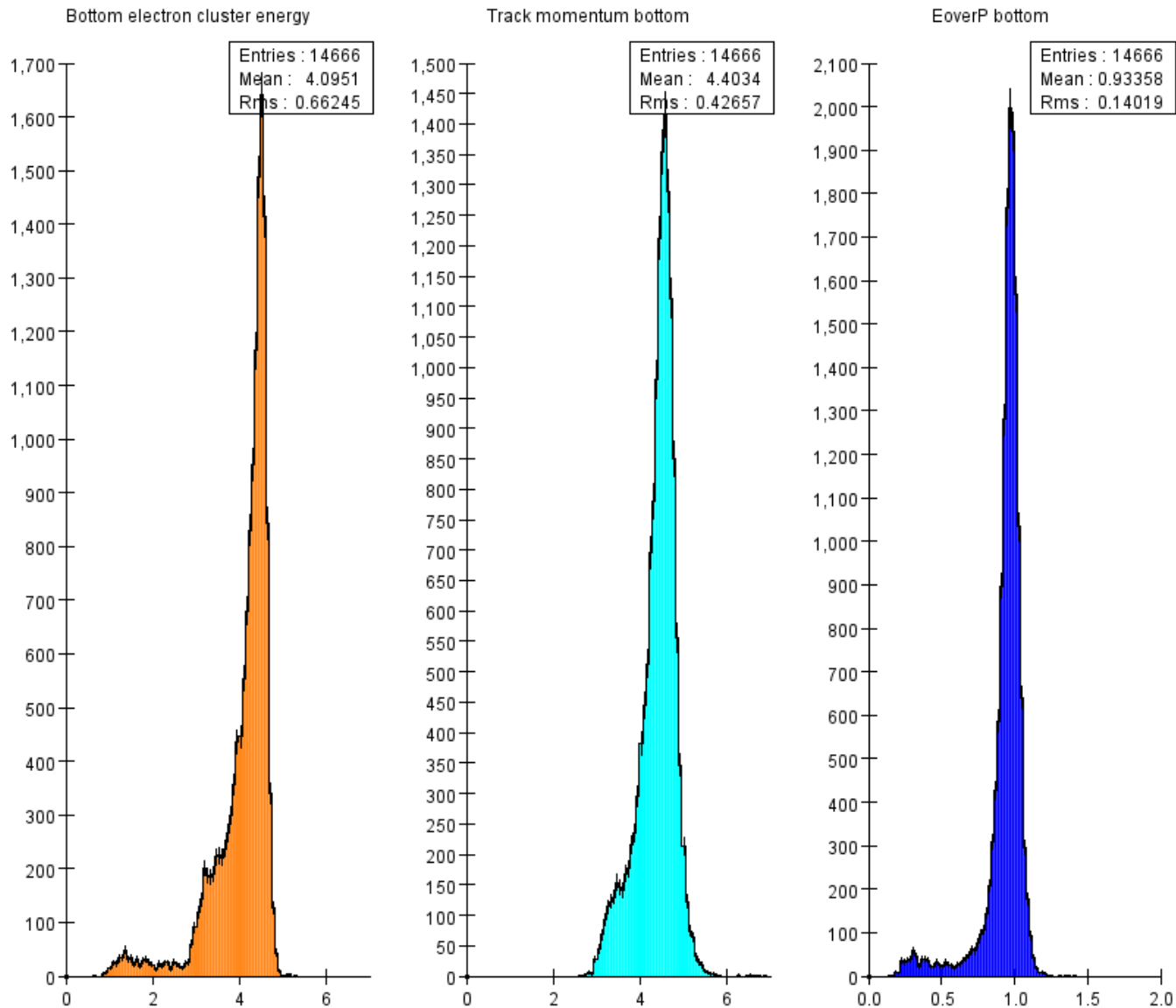
Track & Cluster Times 8ns



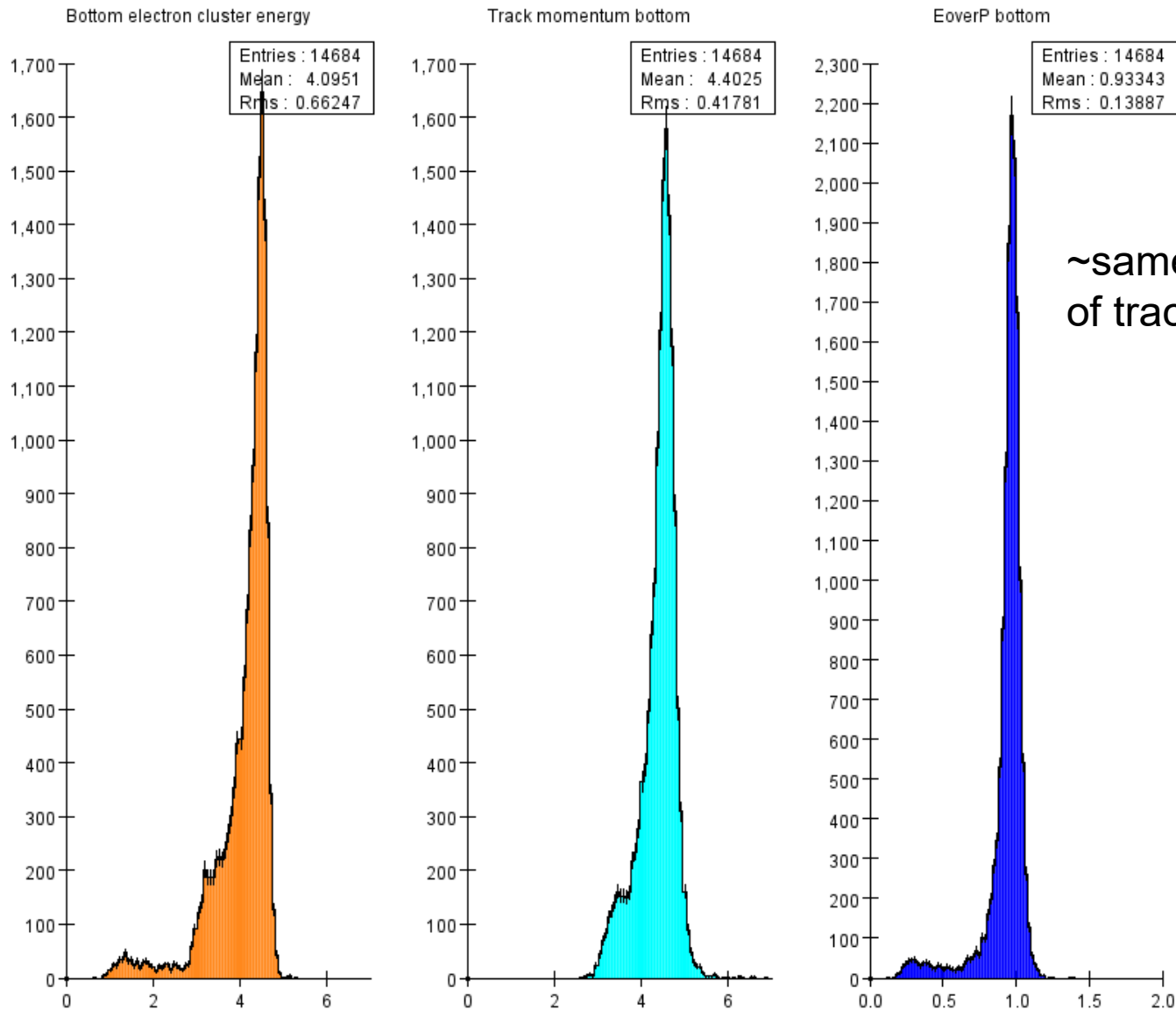
Track & Cluster Times 20ns



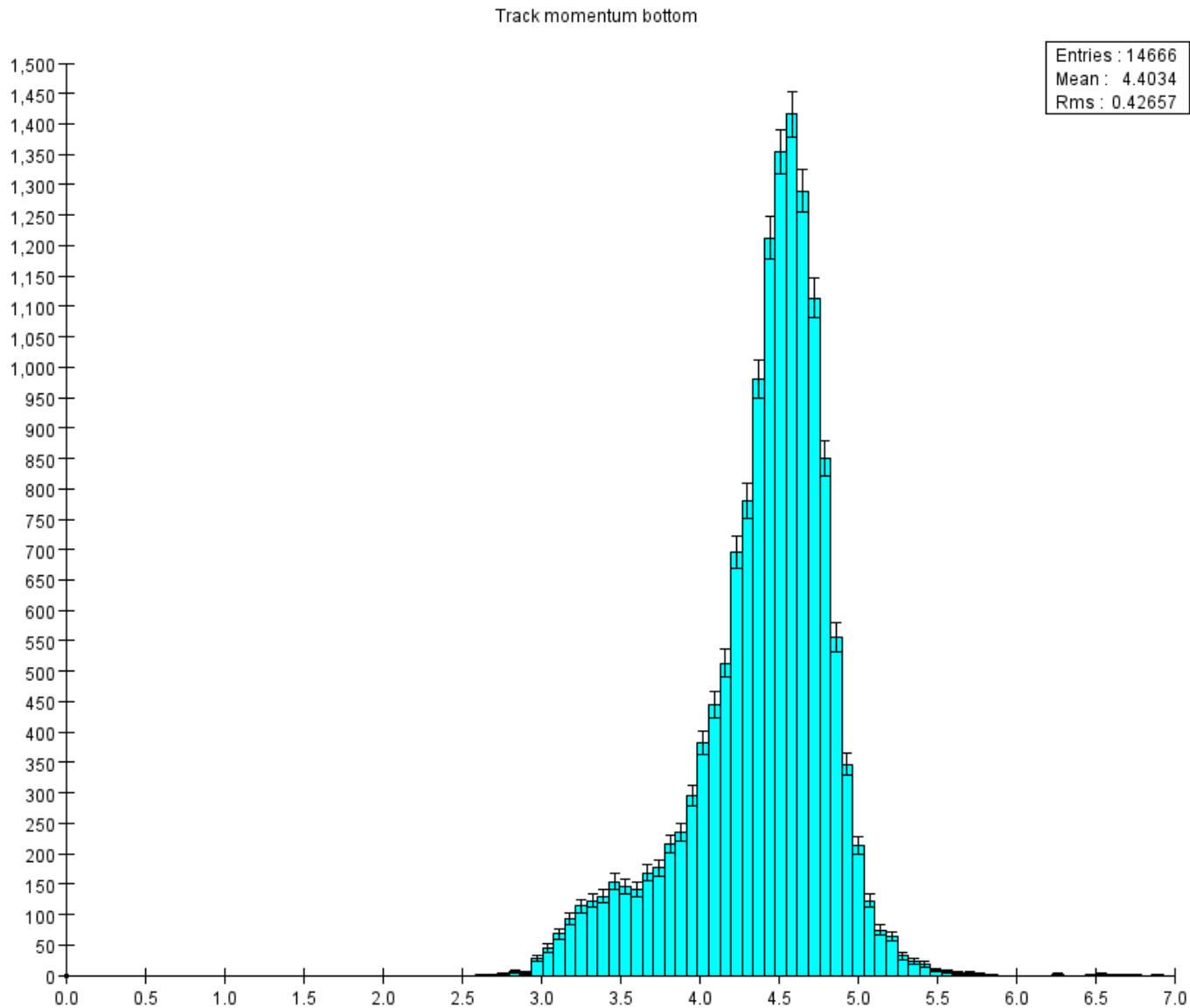
Energy, Momentum, E/p 8ns



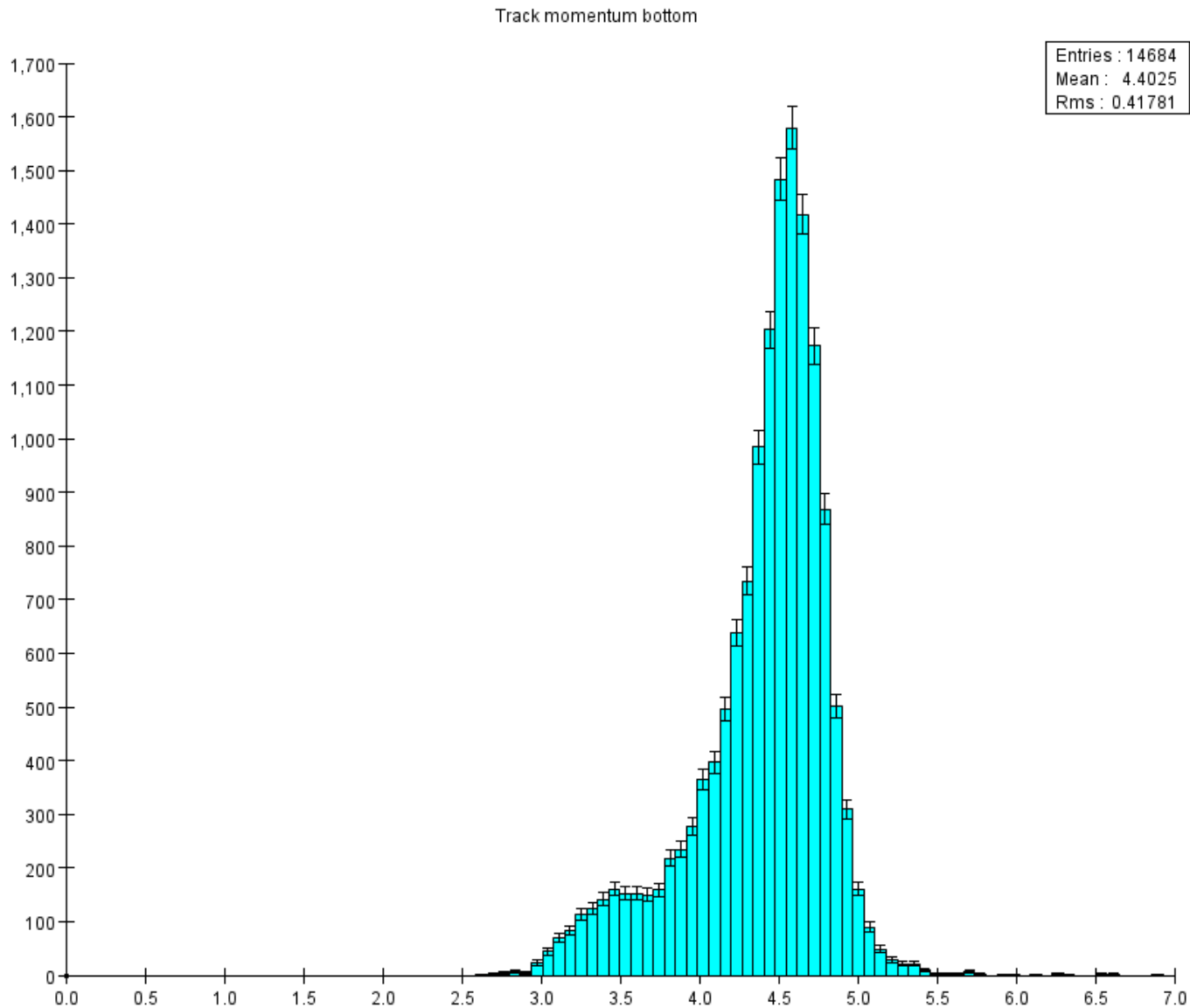
Energy, Momentum, E/p 20ns



Track Momentum δ ns

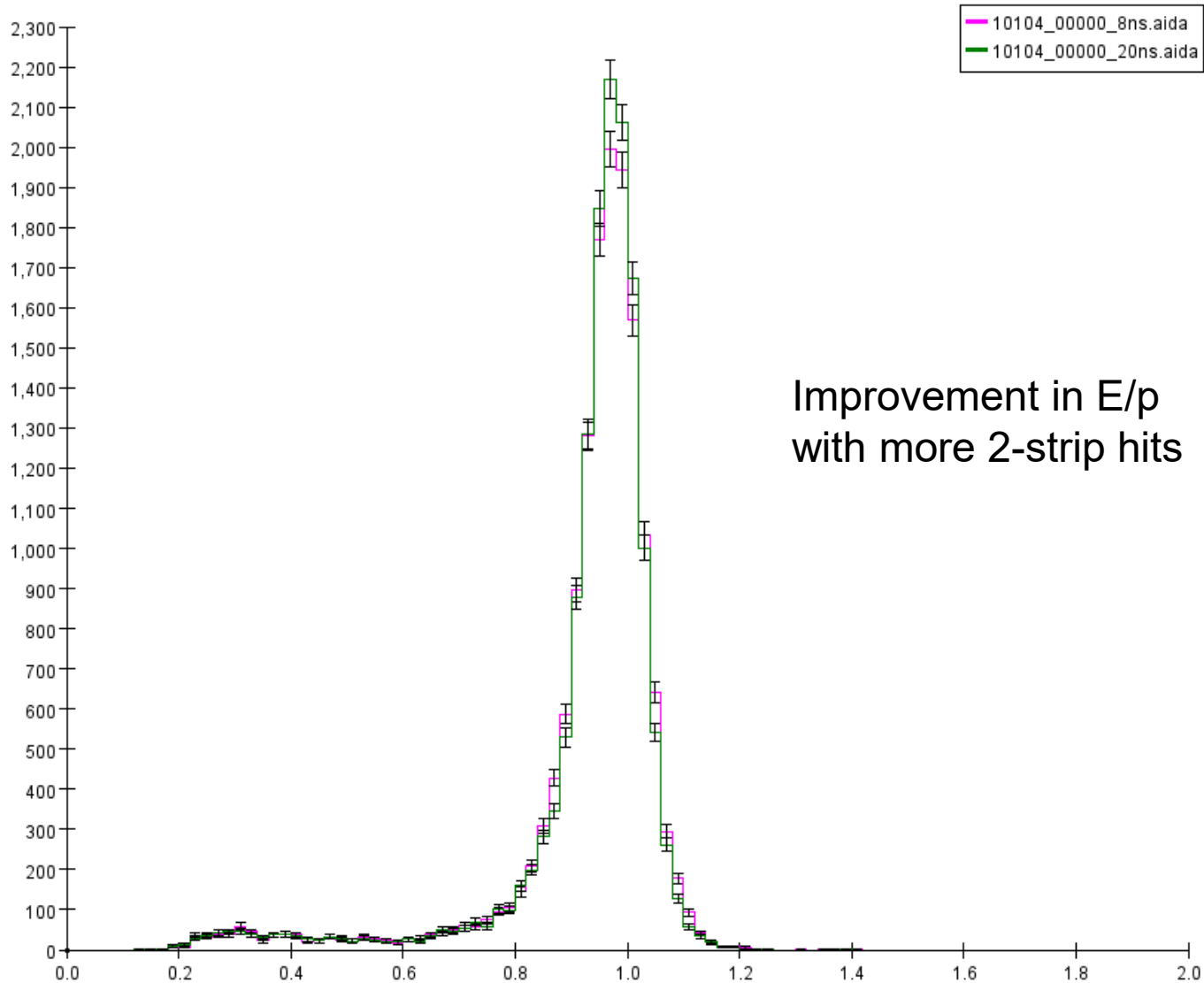


Track Momentum 20ns



E/p 8/20 ns

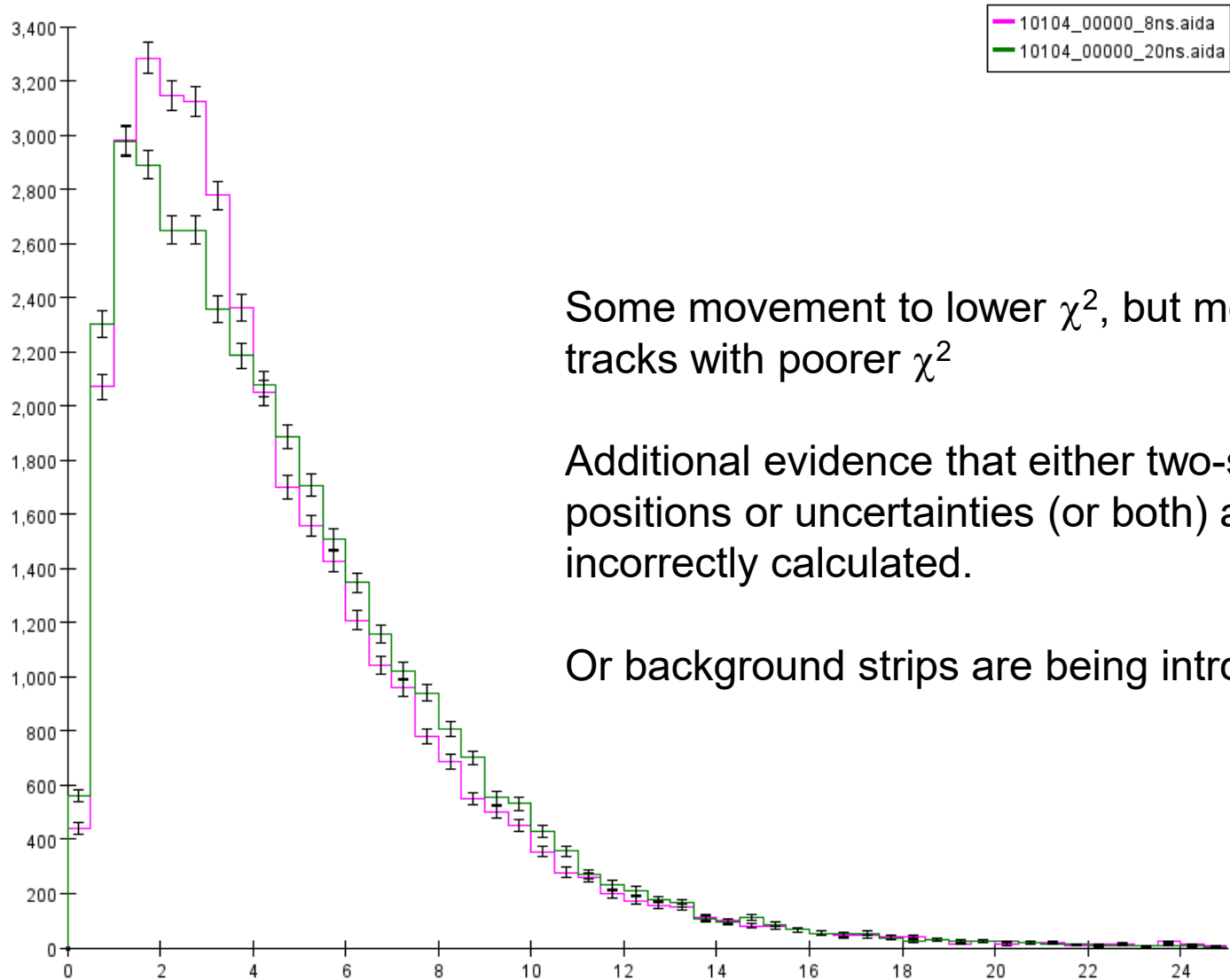
FinalStateParticles_KF - fiducial - kf electron - EoverP bottom



Improvement in E/p
with more 2-strip hits

Track Chi-squared 8/20 ns

FinalStateParticles_KF - kf electron - Track chisq per df bottom



Some movement to lower χ^2 , but more tracks with poorer χ^2

Additional evidence that either two-strip hit positions or uncertainties (or both) are being incorrectly calculated.

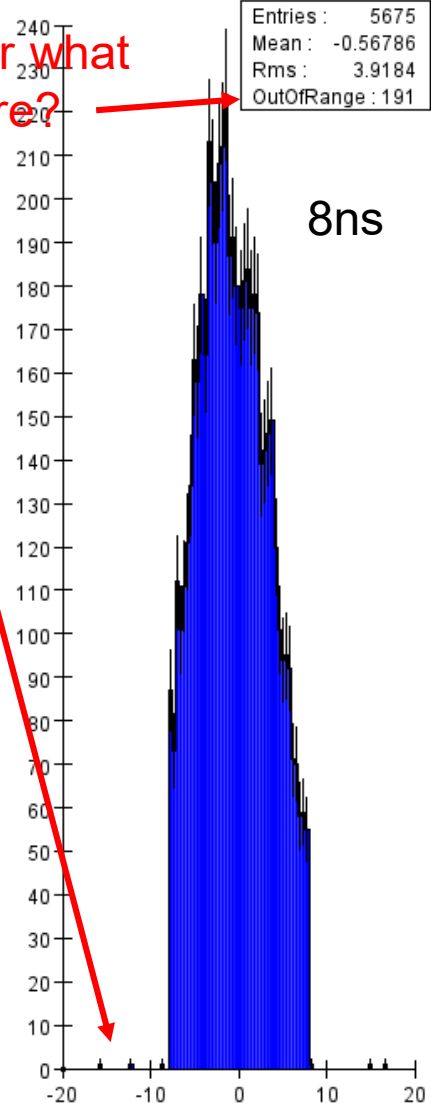
Or background strips are being introduced.

Summary

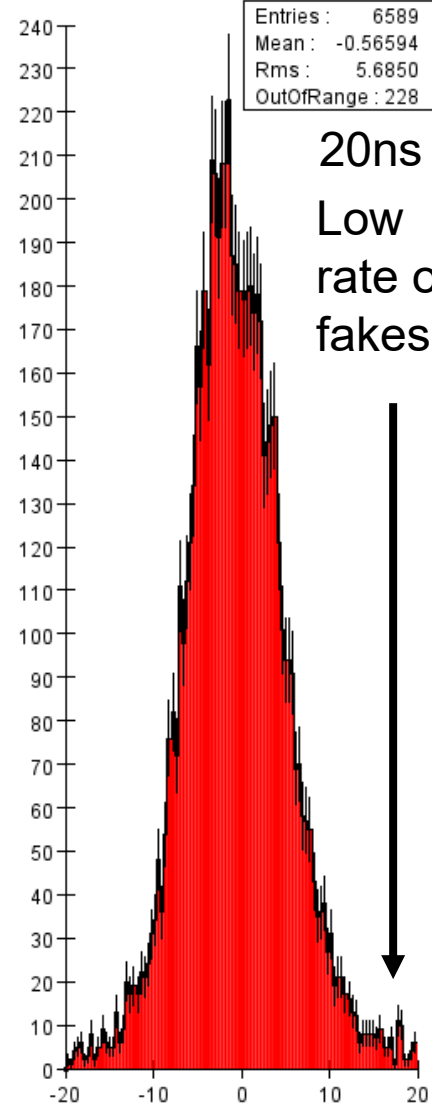
- Opening up the time window for strip clustering from 8ns to 20s does not appear to introduce any appreciable background
 - delta-time distribution \sim baseline resolved
- Promotion of single-strip clusters to two-strip clusters leads to an improvement in the track momentum reconstruction.
- Promotion of single-strip clusters to two-strip clusters leads to a degradation in the chi-squared
 - Strip-clustering code should be reviewed
 - Position and uncertainty calculations for two-strip hits should be revisited.
- 20ns should be the default for further processing unless we can achieve significant improvements in the time resolution from fitting the APV25 waveforms.

Two-strip Cluster δ Hit Times Layer 1

module_L1b_halfmodule_axial_sensor0 str...



module_L1b_halfmodule_axial_sensor0 str...



FinalStateParticles_KF - kf electron - modul...

