Status of LCTPC beam test analysis in Canada

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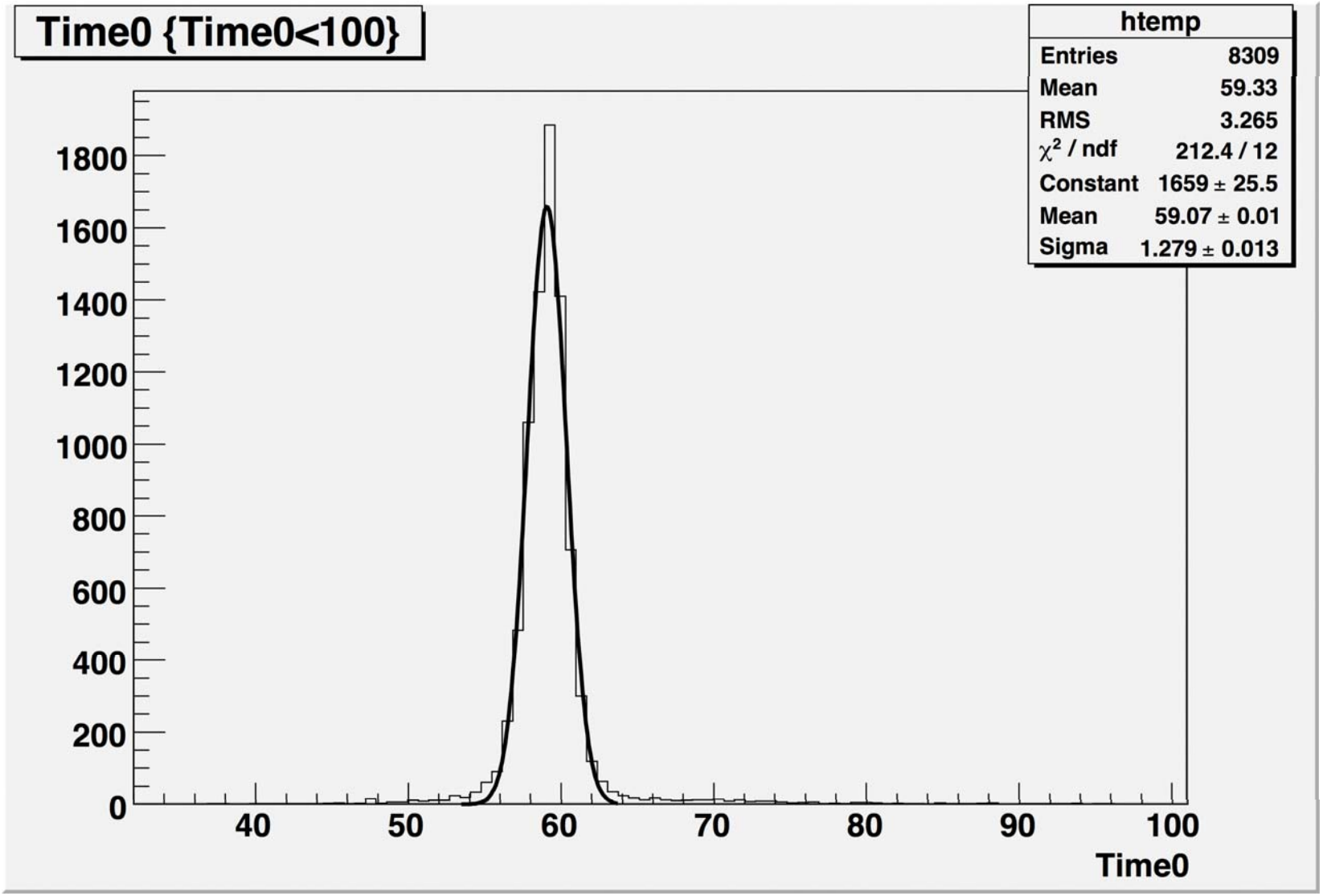
11 February, 2009

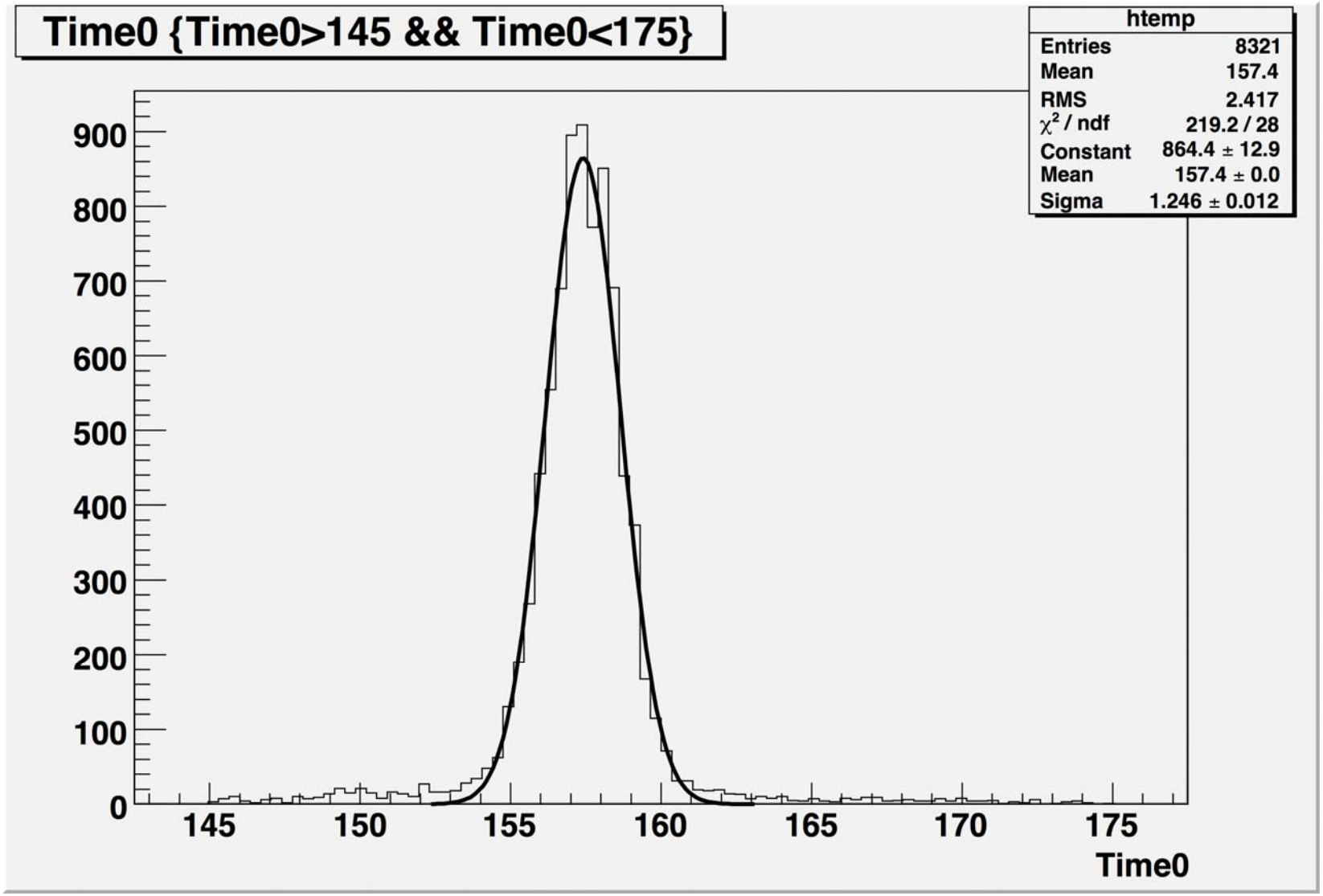
Analysis of B = 1 T data

- $Ar/iC_4H_{10}/CF_4$ (95/2/3) gas mixture
- Two sets of measurements
  - Standard conditions (E = 230 V/cm)
  - Low drift conditions (E = 140 V/cm)
- Transport parameters from Magboltz
  - Standard conditions
    - V_{drift} = 76 μm/ns
    - D_{TR} = 94 μm/√cm
    - D_L = 226 μm/√cm
  - Low drift conditions
    - V_{drift} = 59 μm/ns
    - D_{TR} = 71 μm/√cm
    - D_L = 318 μm/√cm

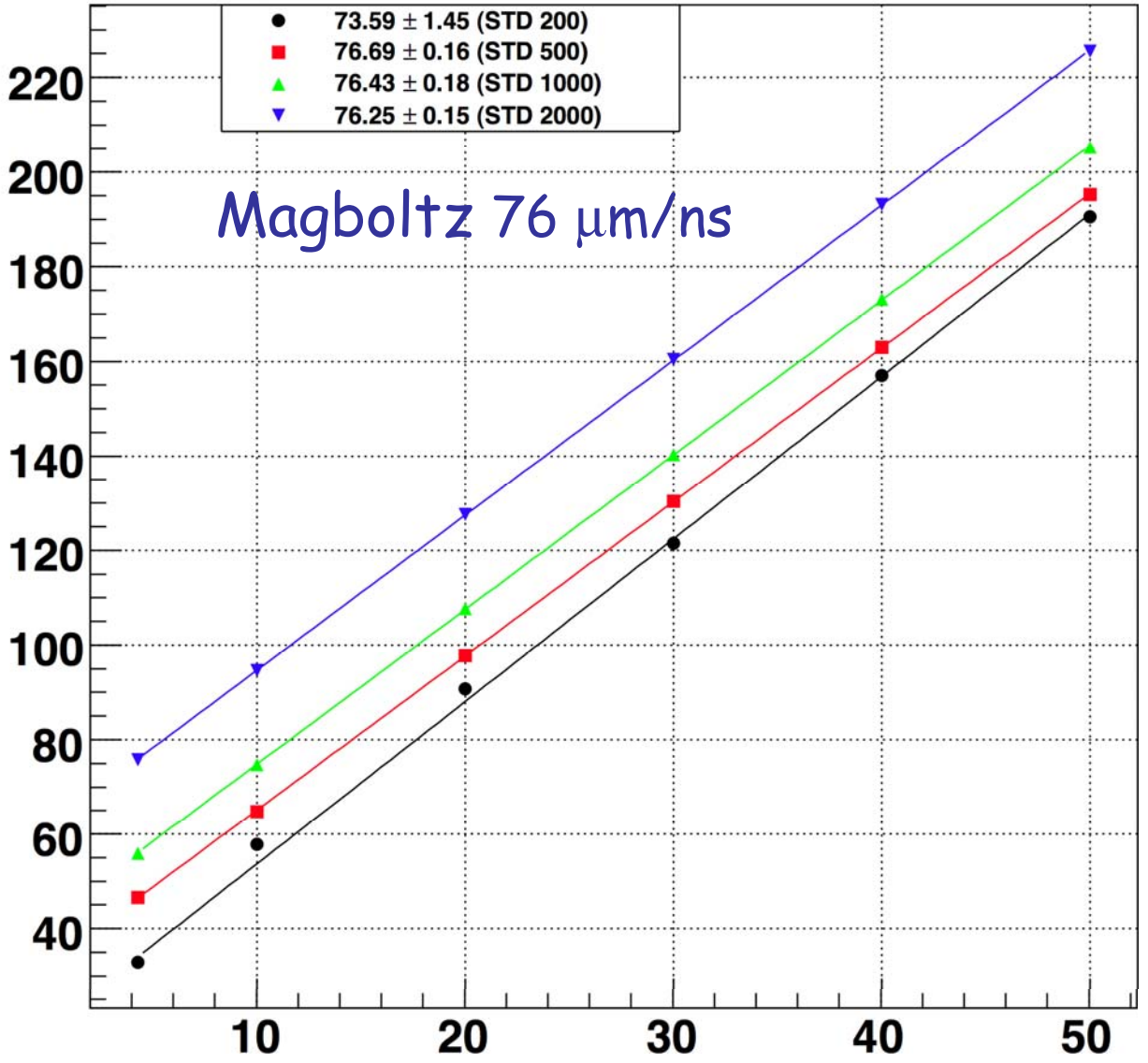
Run 397 time distribution (500 ns shaping Z = 10 cm)



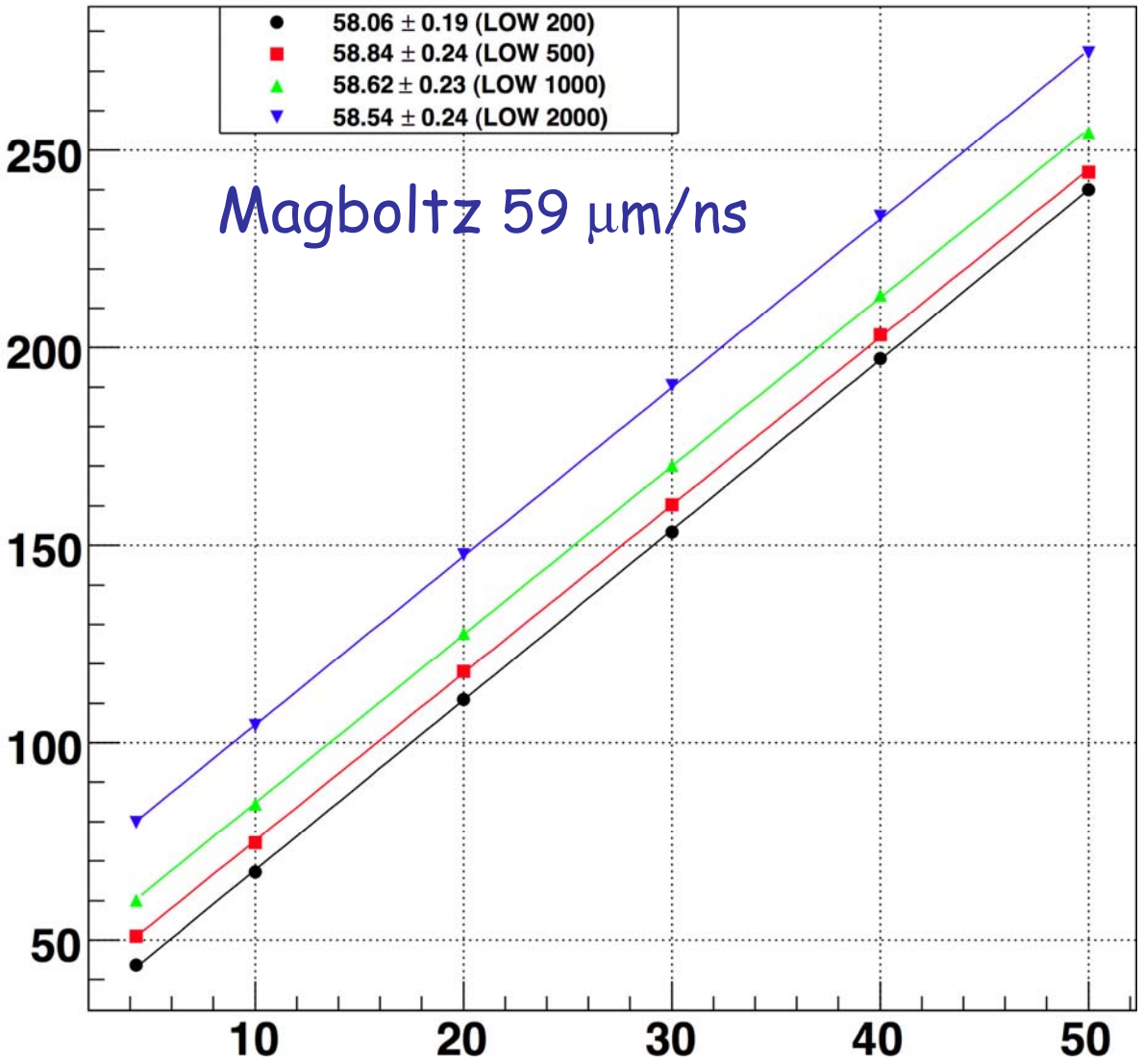
Run 377 time distribution (500 ns shaping Z = 40 cm)



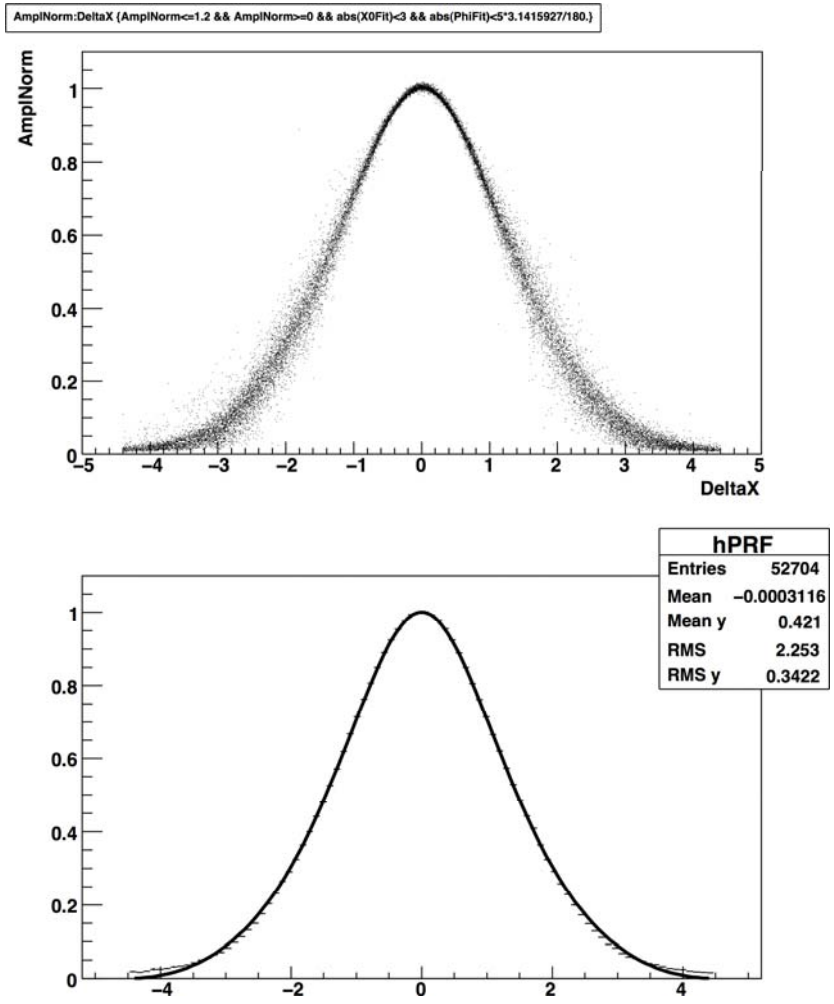
Drift Velocity for STD Drift Cond



Drift Velocity for Low Drift Cond



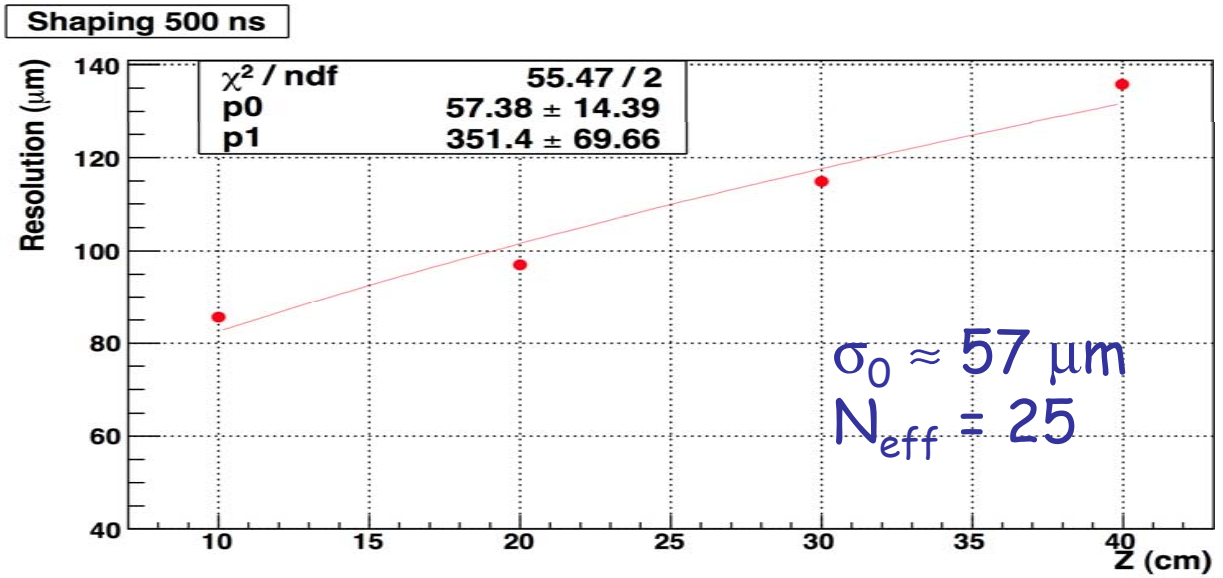
Example PRF determined from data [Run 334]

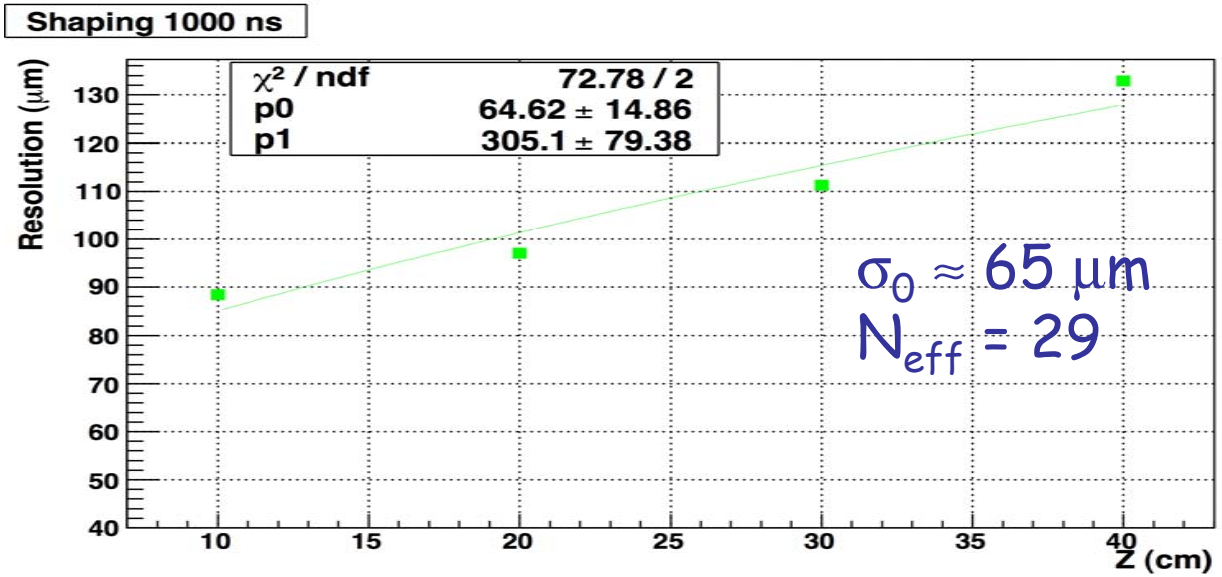


B=1 T Pad Response Function for Z = 30 cm, peaking time = 500 ns

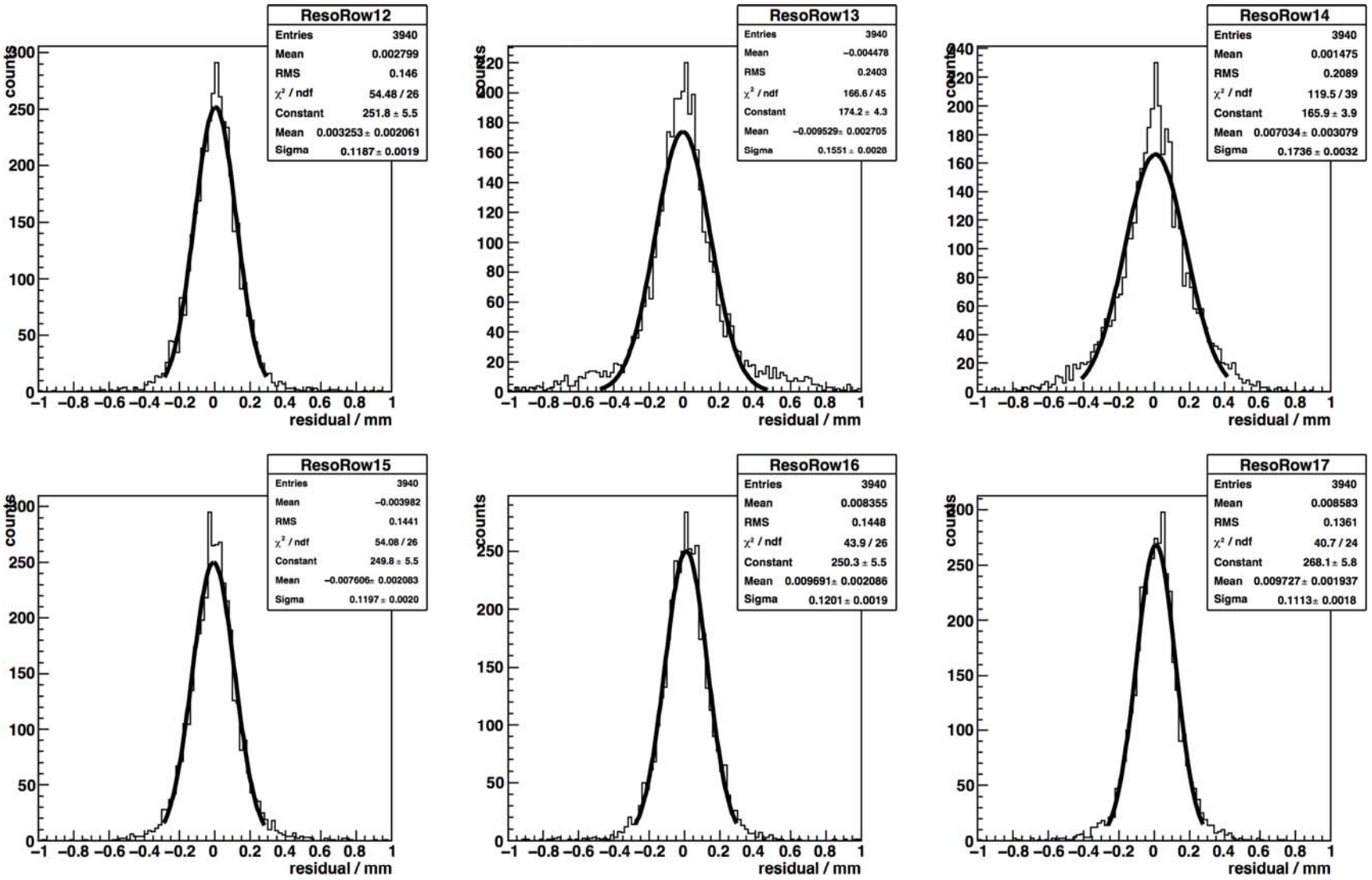
Resolution plots look ok

$\sigma = [(\sigma_0)^2 + (D_{Tr})^2 Z/n_{eff}]^{1/2}$ and use $D_{Tr} = 94\ \mu m/\sqrt{cm}$ (Magboltz)



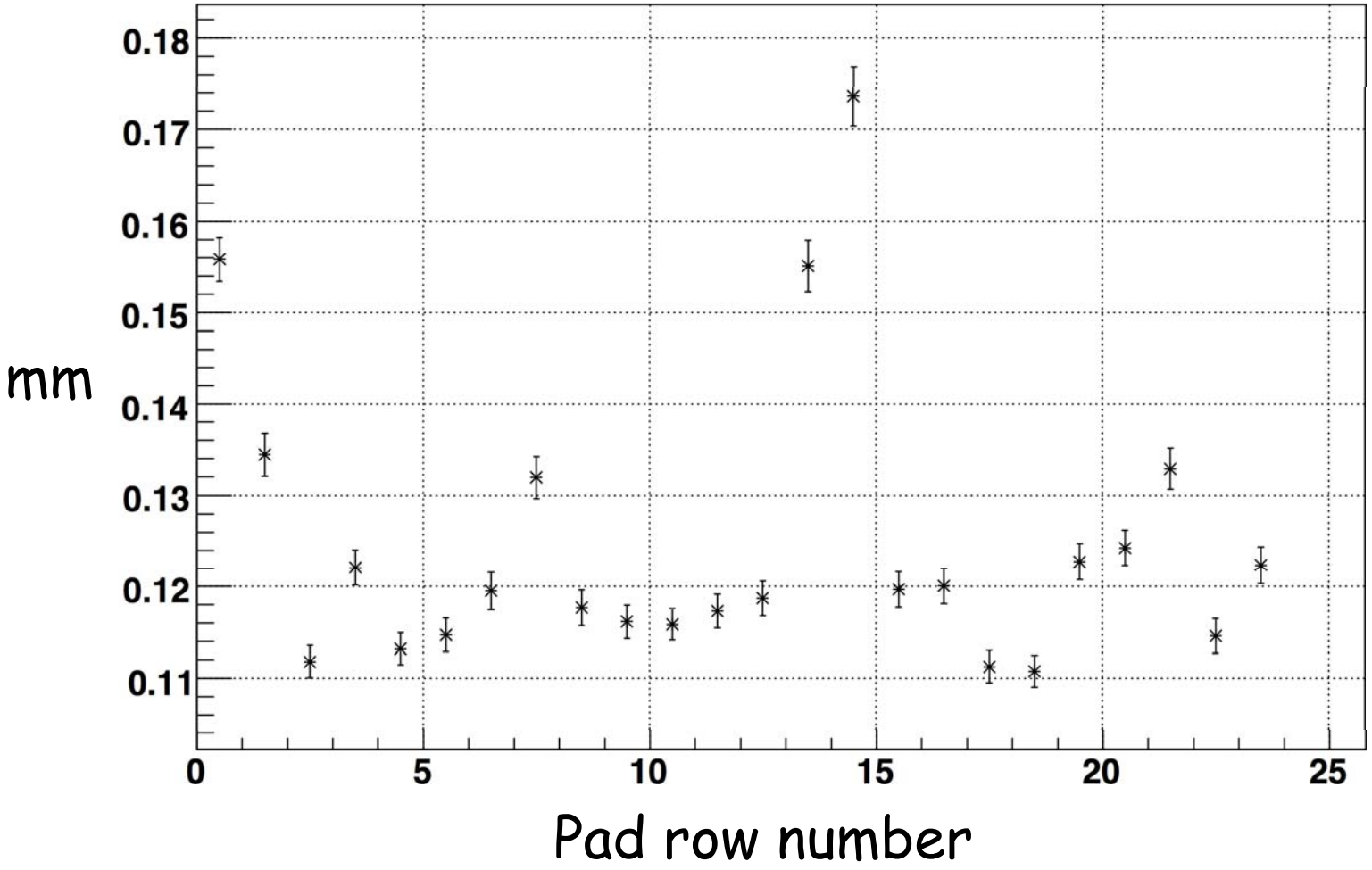


But some problems observed



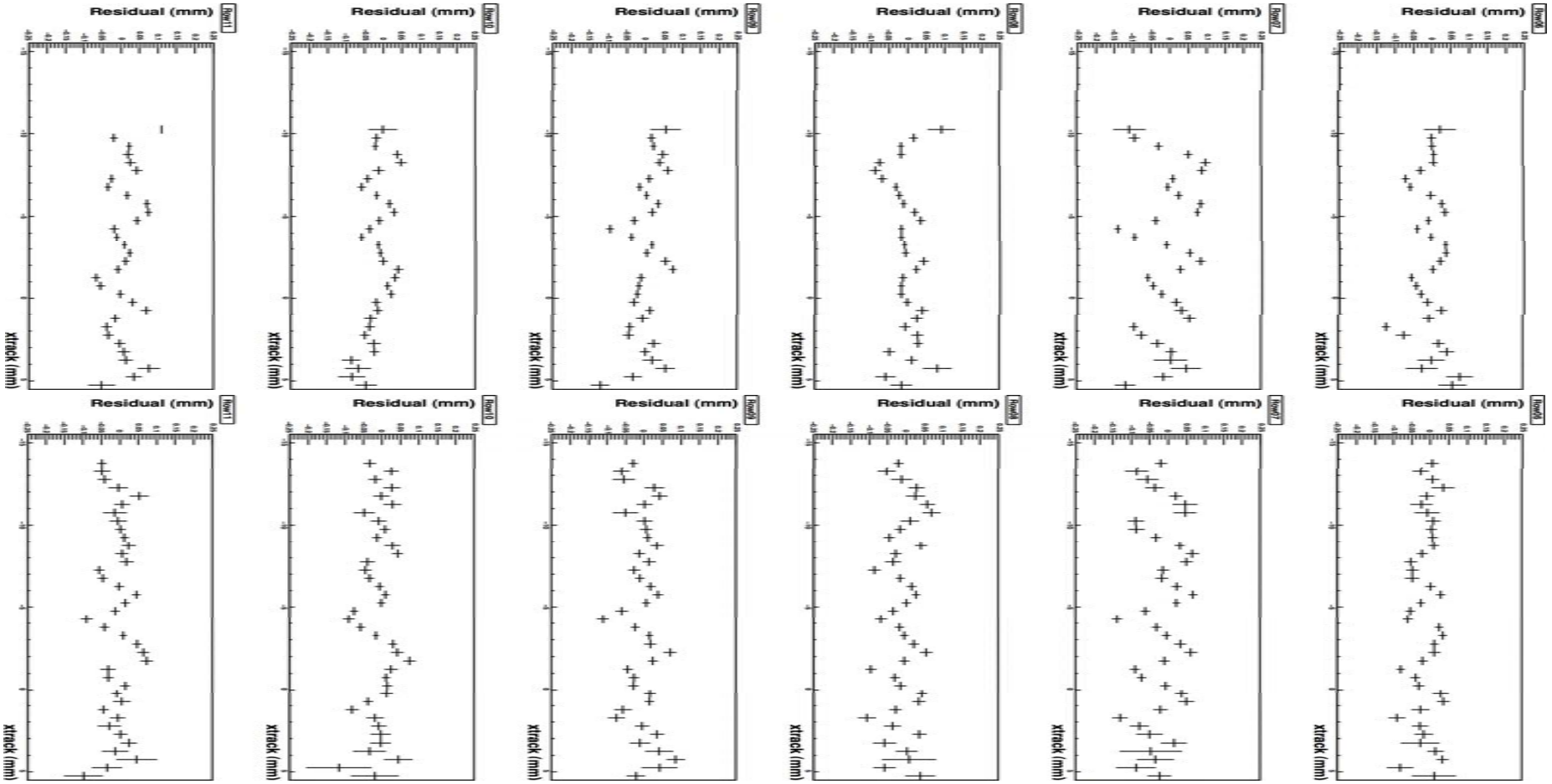
Residual distributions for some pad rows are too wide

Distribution of standard deviation of residuals



Need to understand why

Bias correction for rows 6 to 11



Initial bias and bias remaining after correction

Have to learn how to handle/reduce bias for large area detectors

Conclusion

- Data taken with shaper amplifier reduces information and limits analysis
- Future data will be without the shaper amplifier
- Much remains to be done and we are just starting!