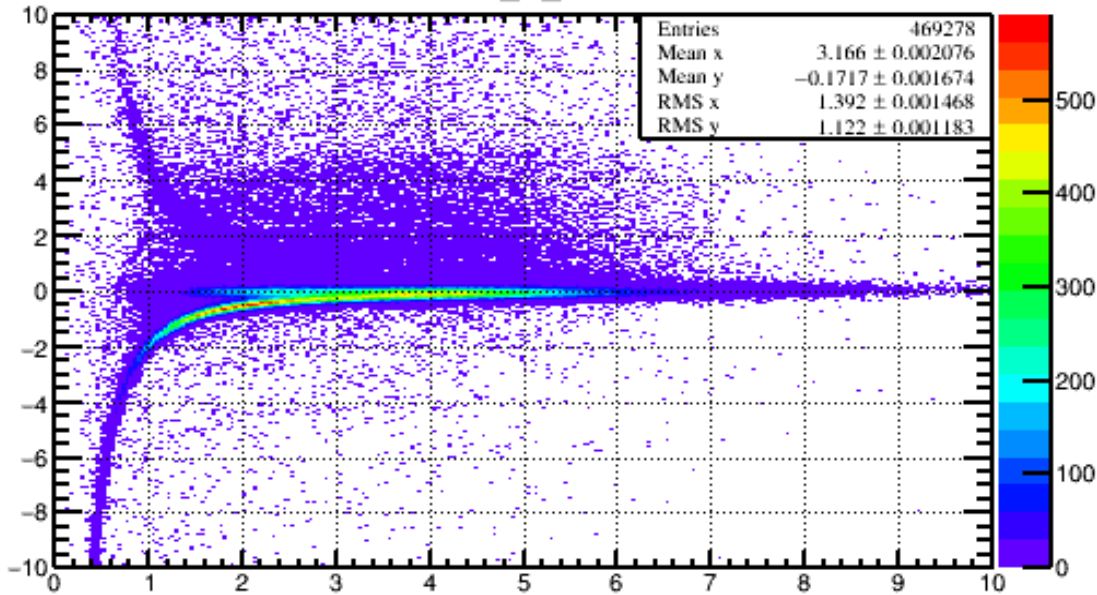


TOF PID Update

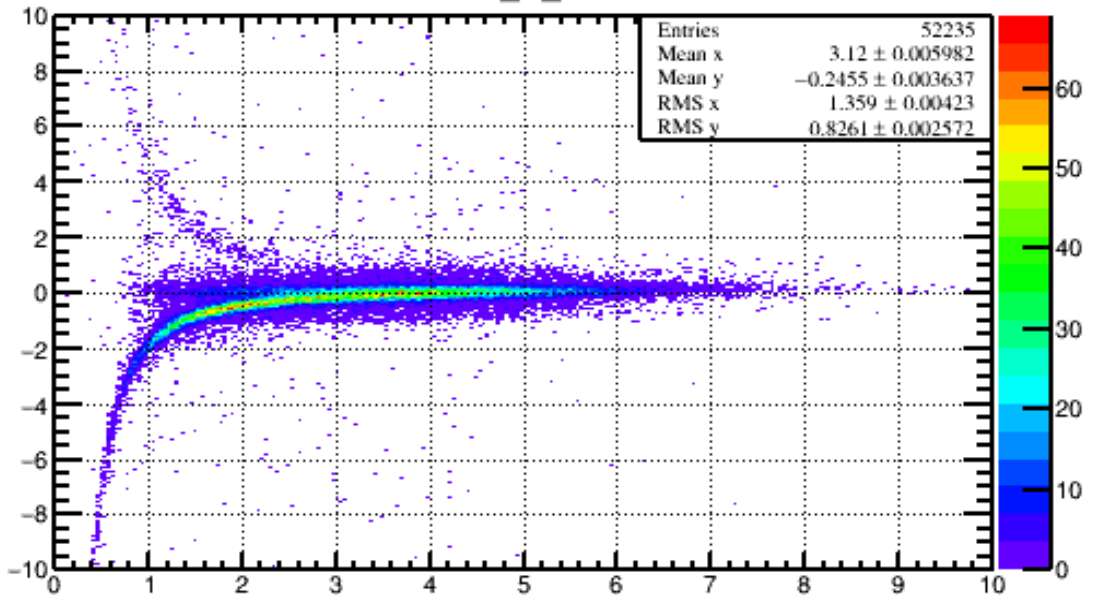
- Reaction: $\gamma p \rightarrow p \varphi$
- Data: Spring 2016 Runs [011484-011668]
Labeled as “@is_production”, ver05
- Cuts:
 - PhiMass[0.95-1.1],
 - MissingMassSquared[-0.08,0.08],
 - dEdx_CDC and DeltaT of Proton
 - Kinematic fitter must converge
- Purpose: Searching for an exclusive phi reaction produces a kaon rich final state; ideal for kaon PID studies at GlueX

DeltaTVsP

DeltaT_P_KPlus



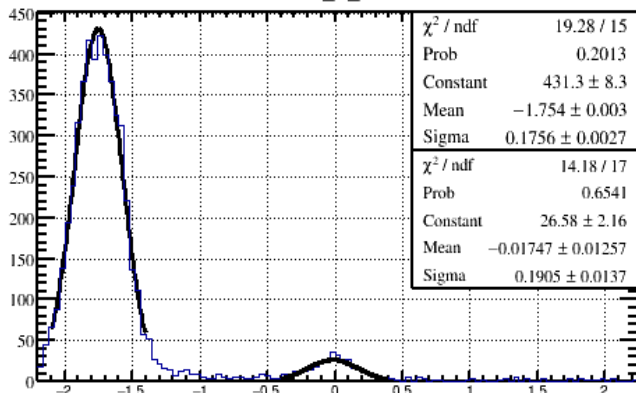
DeltaT_P_KPlus



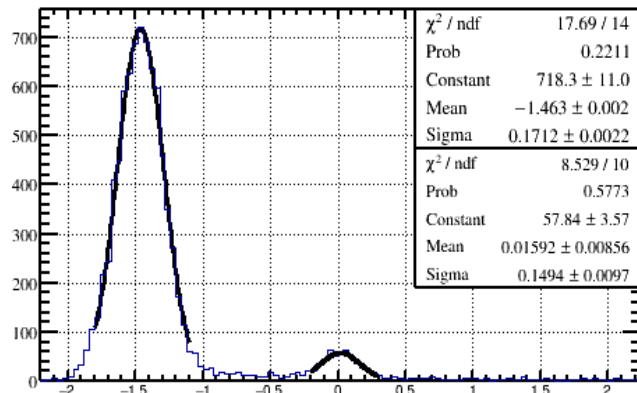
- (above) Monte Carlo for DeltaT TOF versus momentum for a hypothesized Kplus
- (below) Data for DeltaT TOF versus momentum for a hypothesized Kplus
- Observation: Large amount of extra background above Kaon band in MC as compared to data
- Procedure: Do y axis projections using momentum ranges of 0.1 between 1 and 2 GeV in order to study pion/kaon separation for the TOF
- Compare final result to Ostrovidov collaboration presentation

List of 9 Delta T Projections (MC)

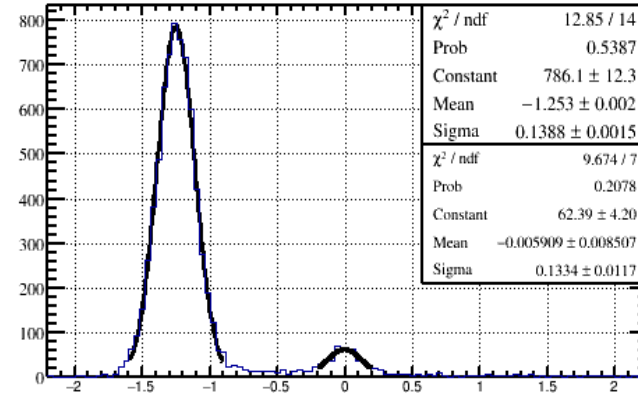
DeltaT_P_KPlus



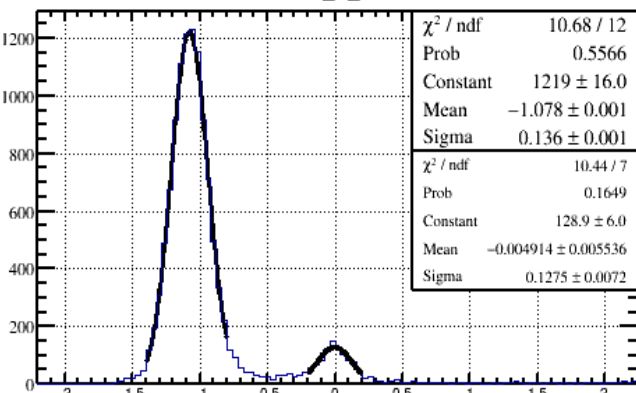
DeltaT_P_KPlus



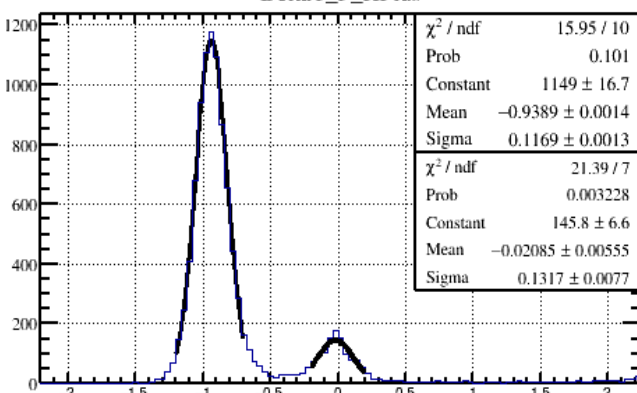
DeltaT_P_KPlus



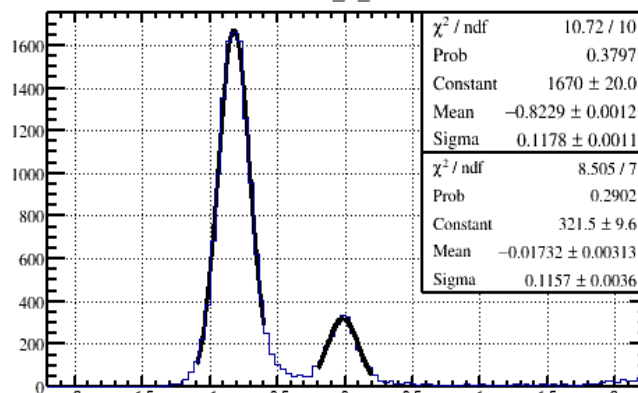
DeltaT_P_KPlus



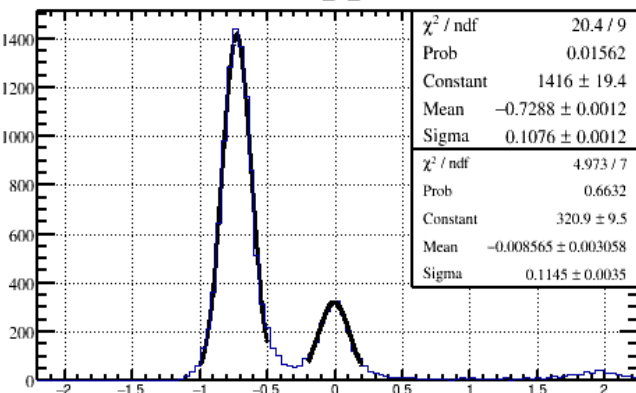
DeltaT_P_KPlus



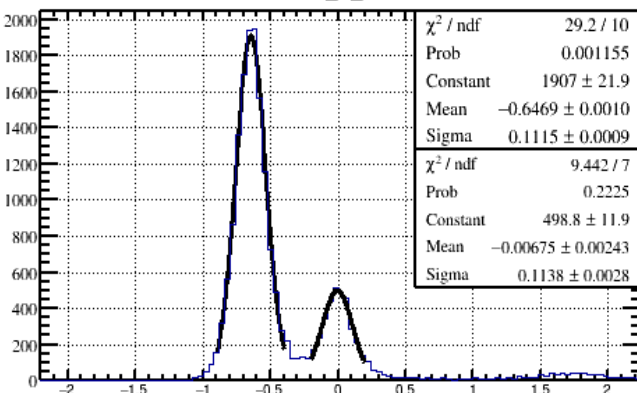
DeltaT_P_KPlus



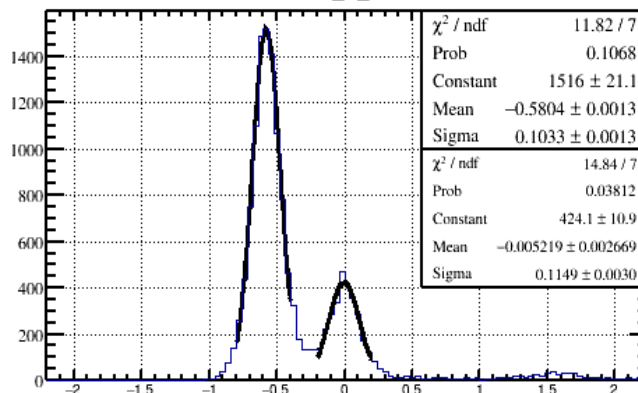
DeltaT_P_KPlus



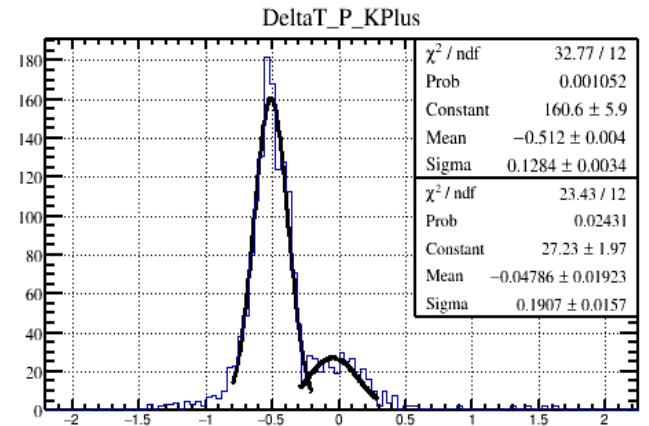
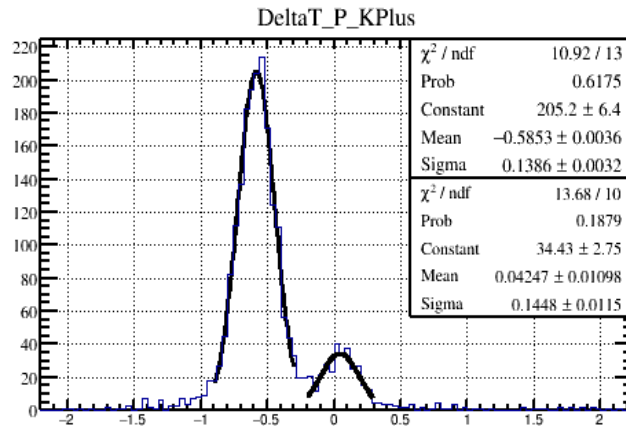
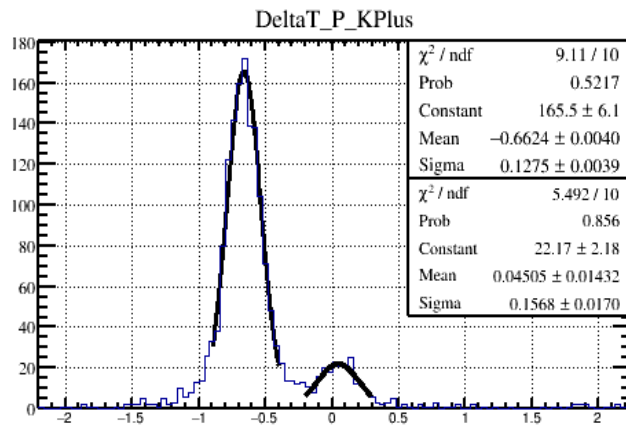
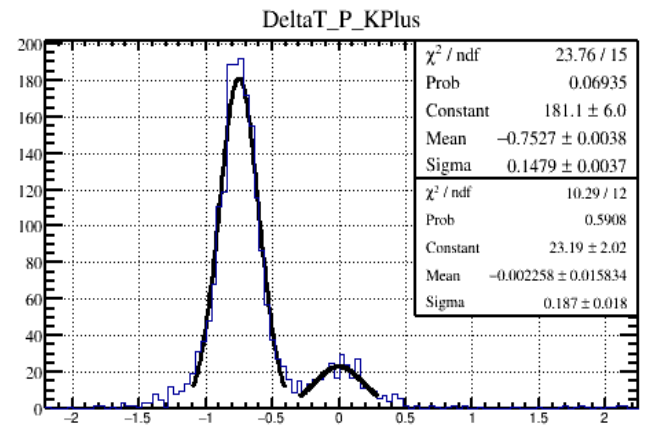
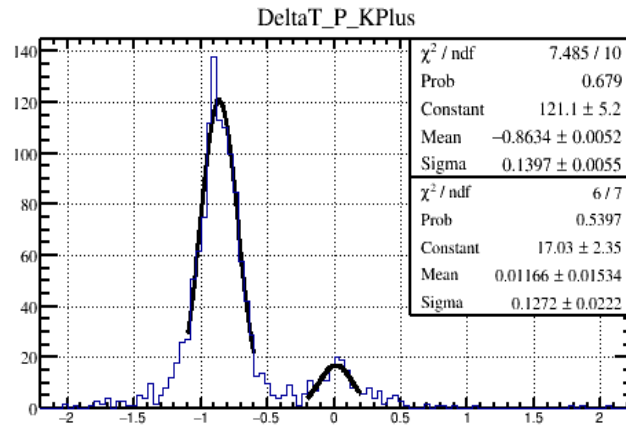
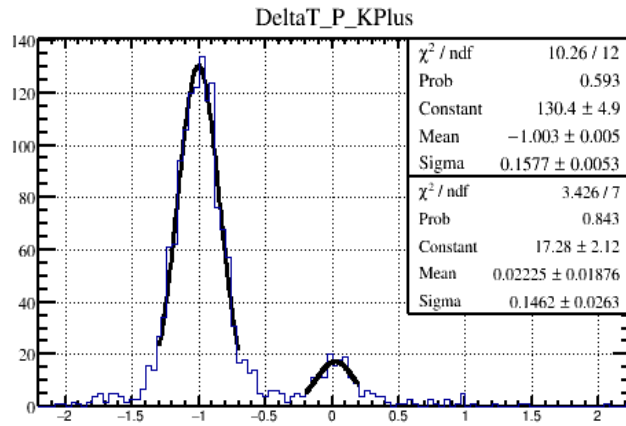
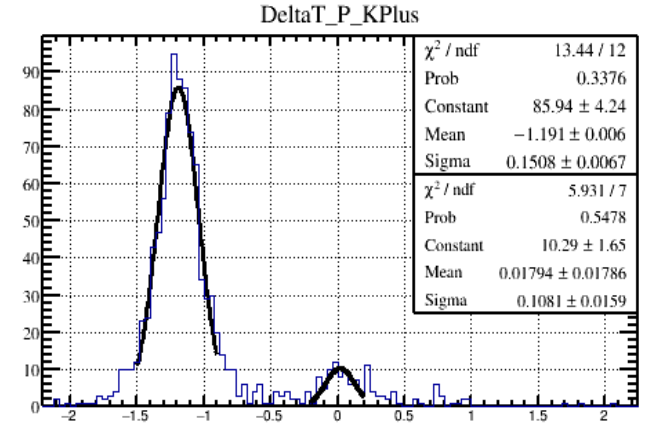
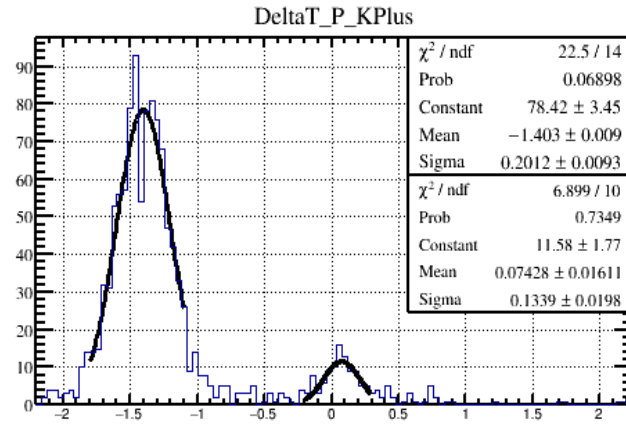
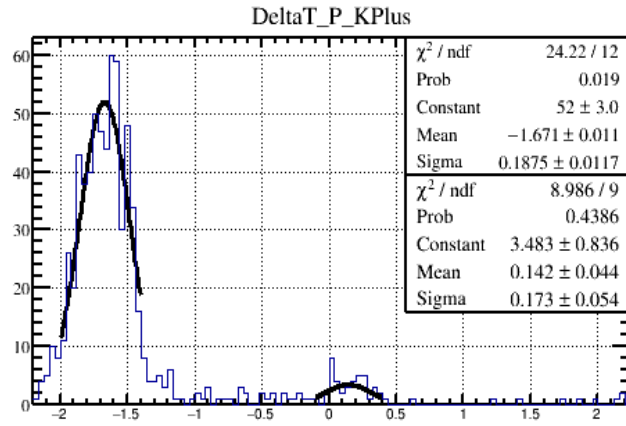
DeltaT_P_KPlus



DeltaT_P_KPlus

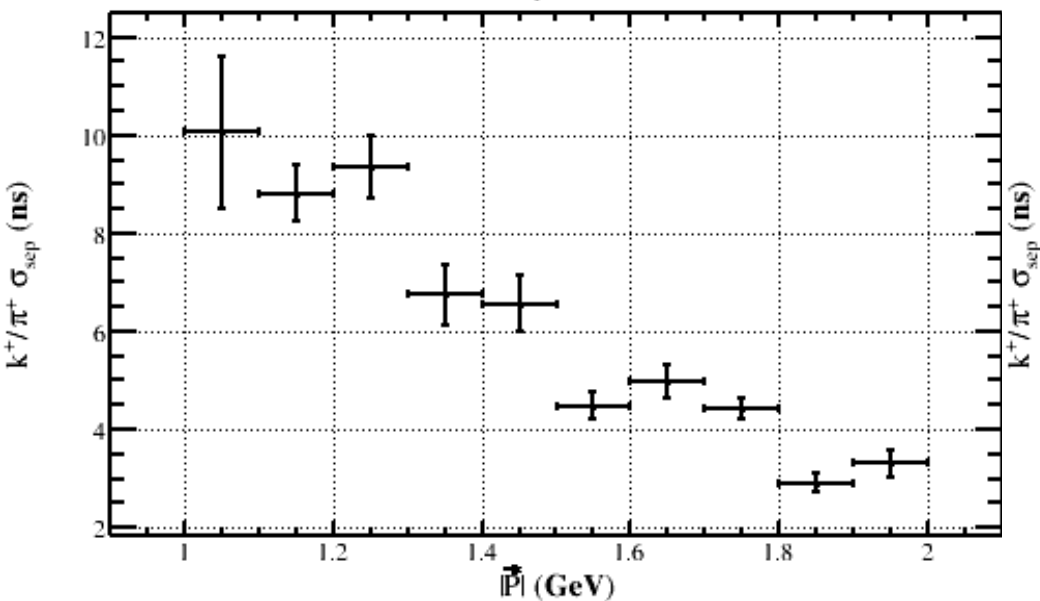


List of 9 Delta T Projections (Data)

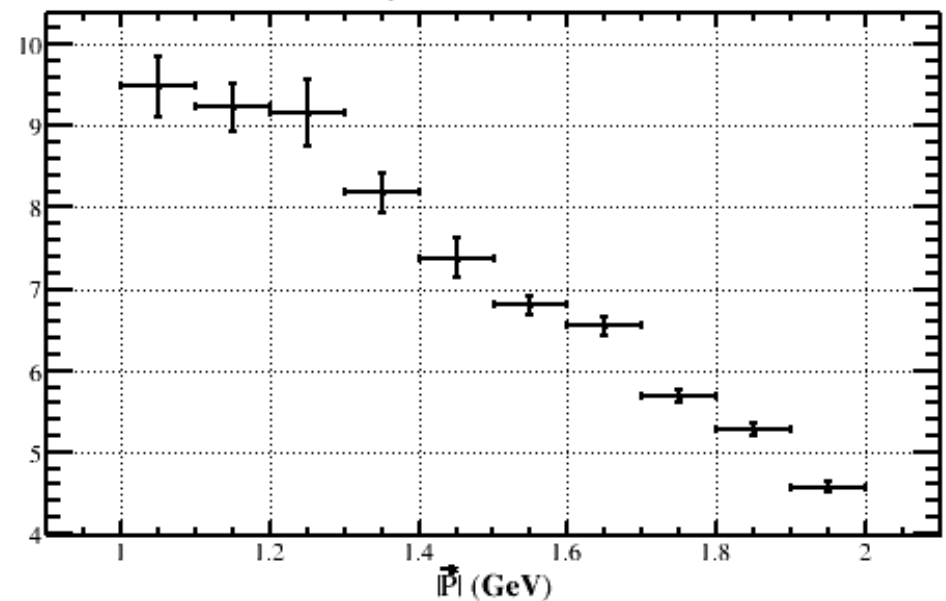


Overview of all Delta T Projections:

$k^+/\pi^+ \sigma_{\text{sep}}$ vs $|\vec{p}|$ Data

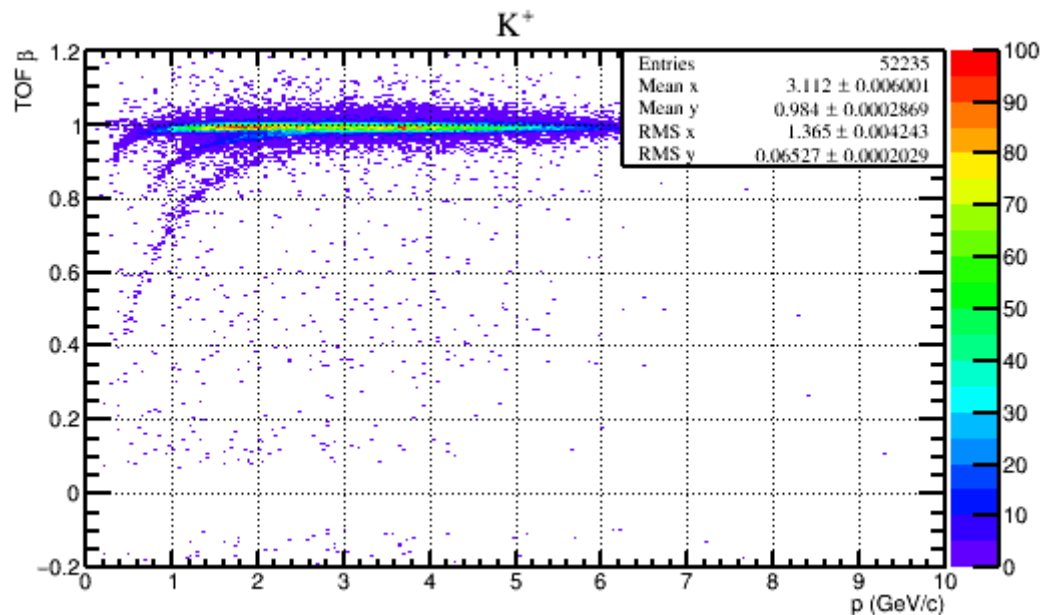
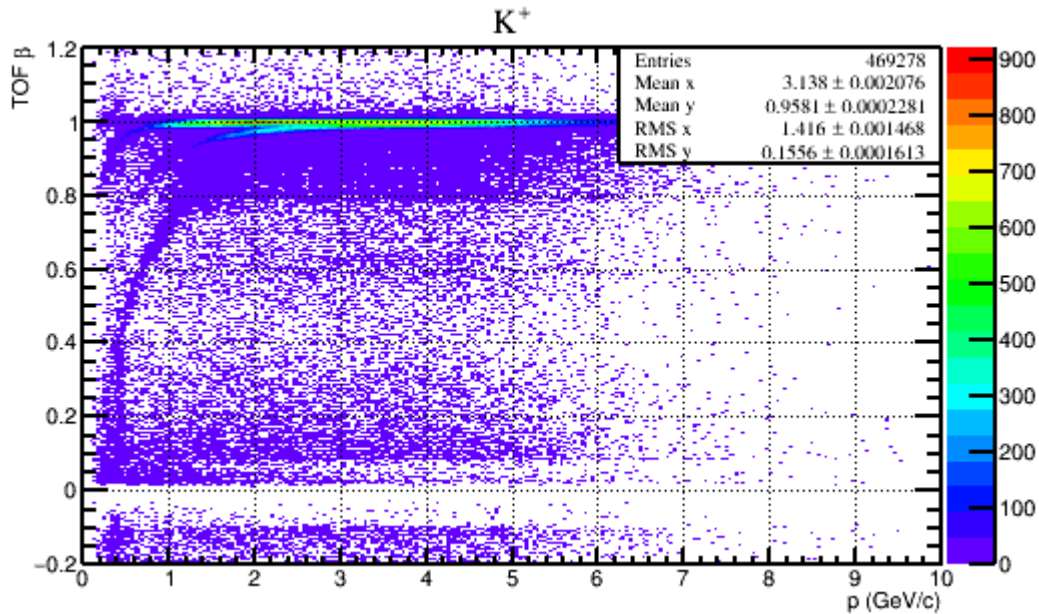


$k^+/\pi^+ \sigma_{\text{sep}}$ vs $|\vec{p}|$ (Monte Carlo)



- Data: Slope ~ -8.8 sep/momentum
- MC: Slope ~ -6.1 sep/momentum
- Ostrovidov:
 - 6.0 sigma @ 1.62 GeV
 - 4.7 sigma @ 1.90 GeV
- Conclusion: MC seems to be 1-2 sigma higher in separation between pions and kaons for the TOF. In order to properly compare with Ostrovidov, the same study is done with beta vs p.

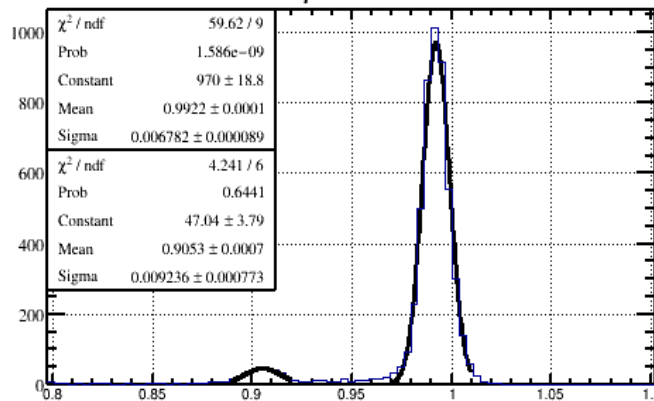
Beta Vs P



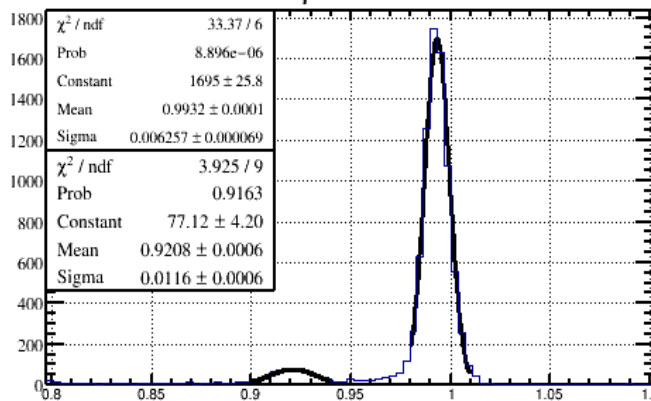
- (above) Monte Carlo for Beta TOF versus momentum for a hypothesized Kplus
- (below) Data for Beta TOF versus momentum for a hypothesized Kplus
- Observation: Large amount of extra background below proton band in MC as compared to data (similar to Delta T plot earlier)
- Procedure: Do y axis projections using momentum ranges of 0.1 between 1 and 2 GeV in order to study pion/kaon Beta separation for the TOF
- Compare final result to Ostrovidov collaboration presentation

List of 9 Beta Projections (MC)

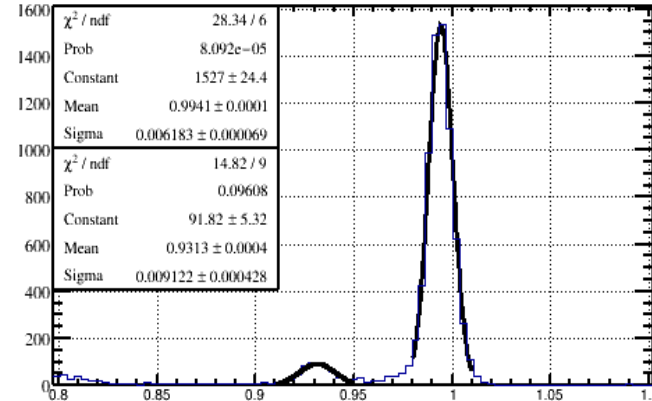
β Vs $|\vec{p}|$



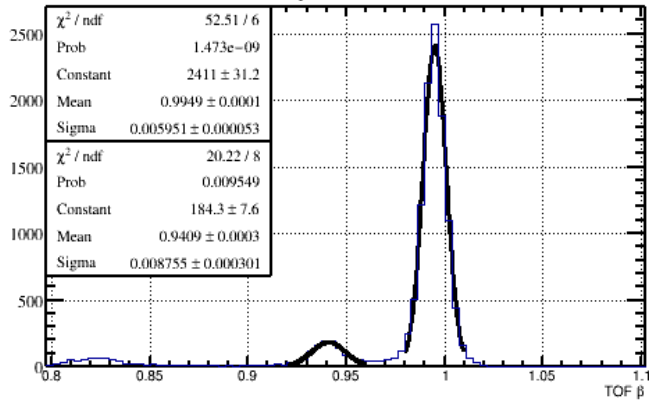
β Vs $|\vec{p}|$



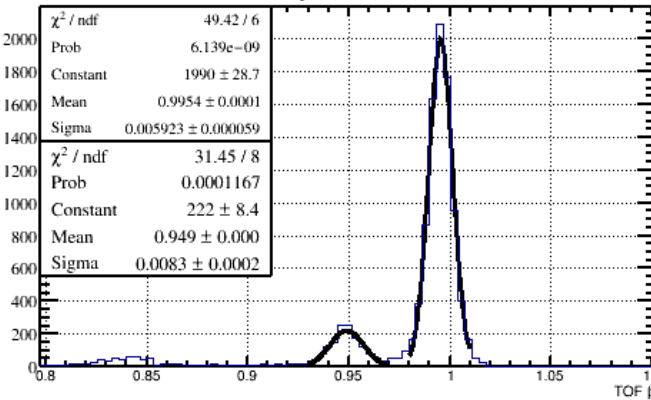
β Vs $|\vec{p}|$



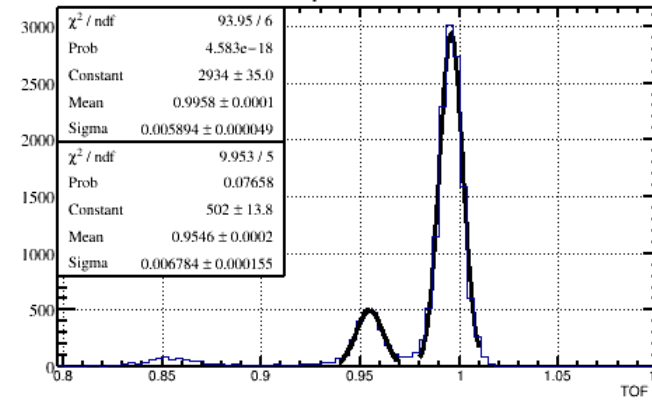
β Vs $|\vec{p}|$



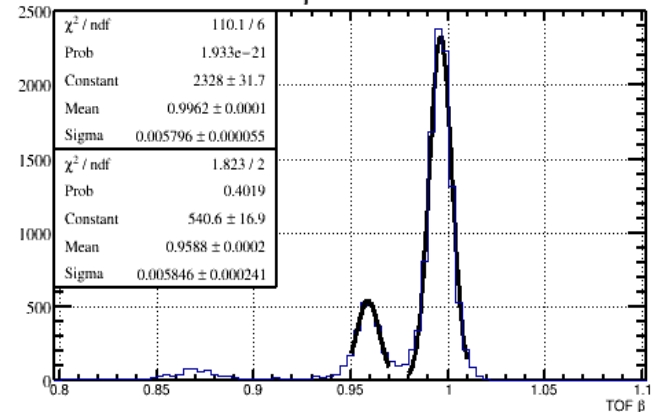
β Vs $|\vec{p}|$



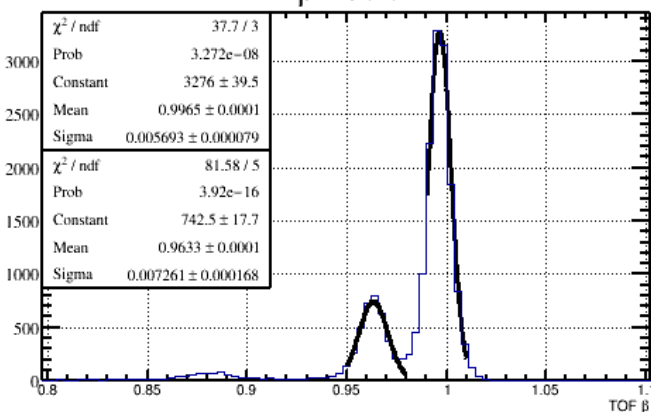
β Vs $|\vec{p}|$



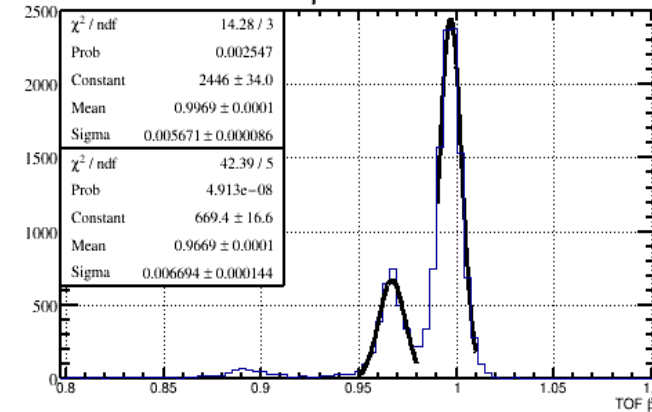
β Vs $|\vec{p}|$



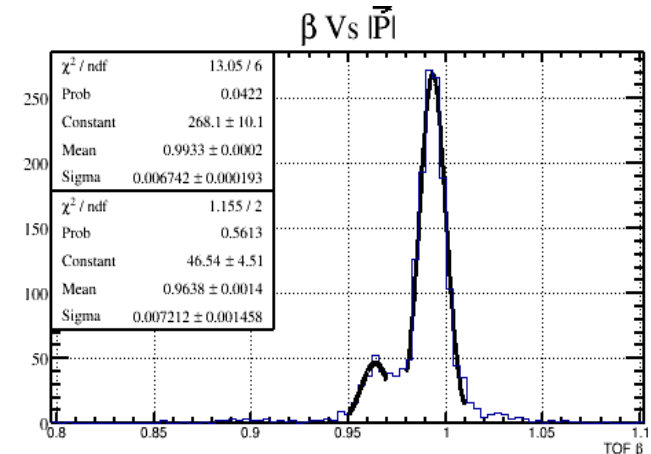
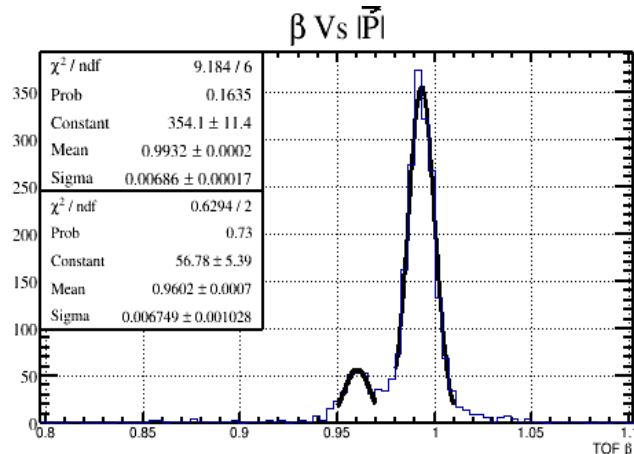
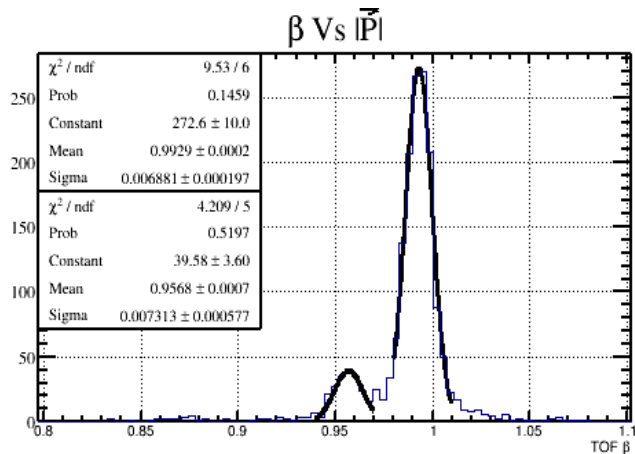
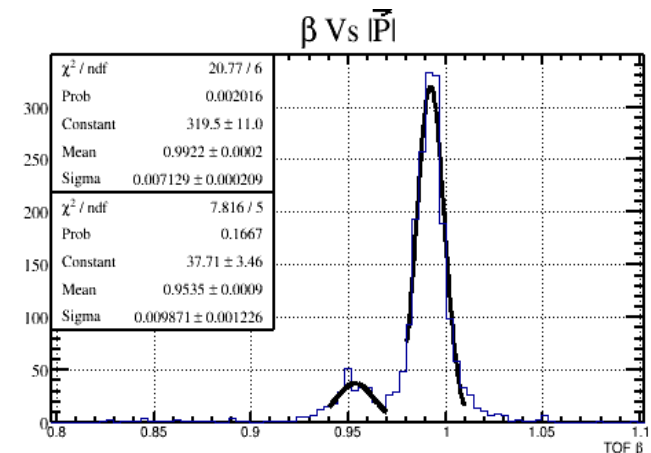
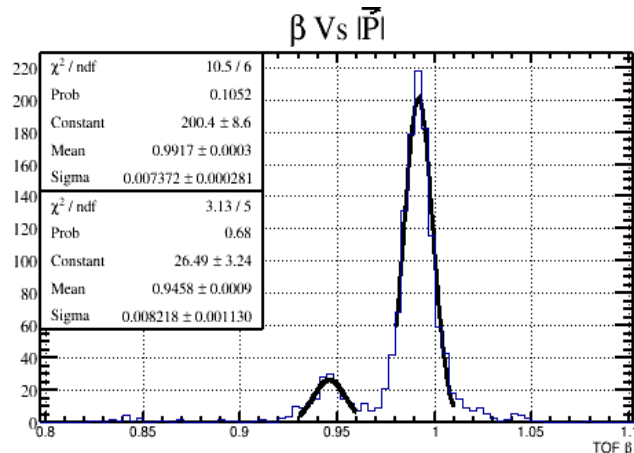
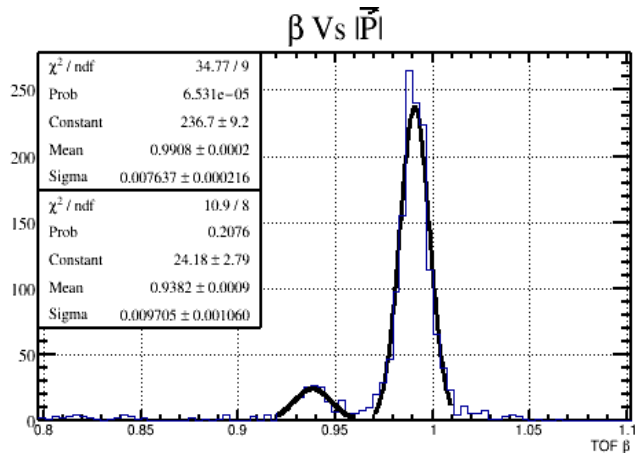
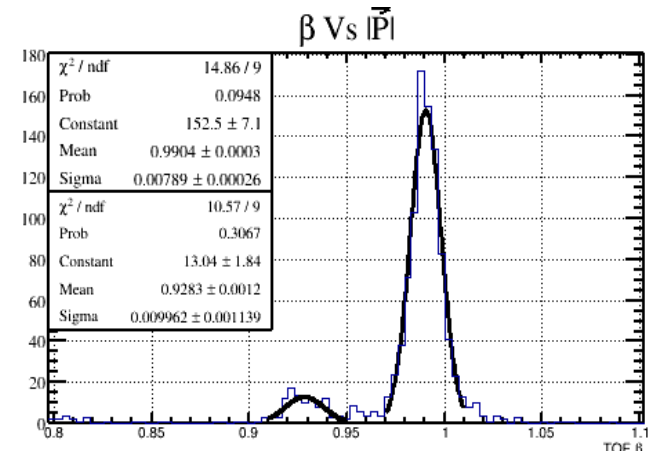
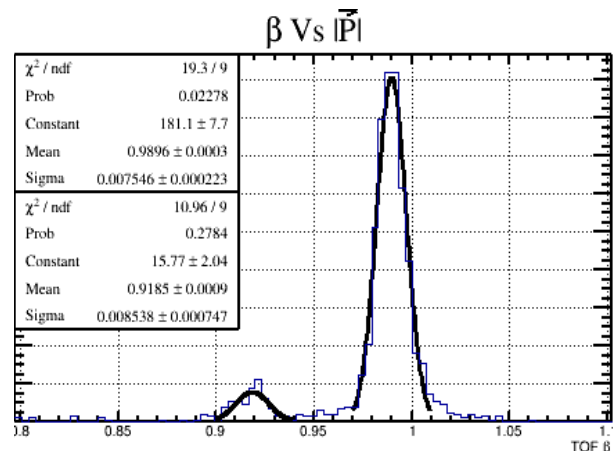
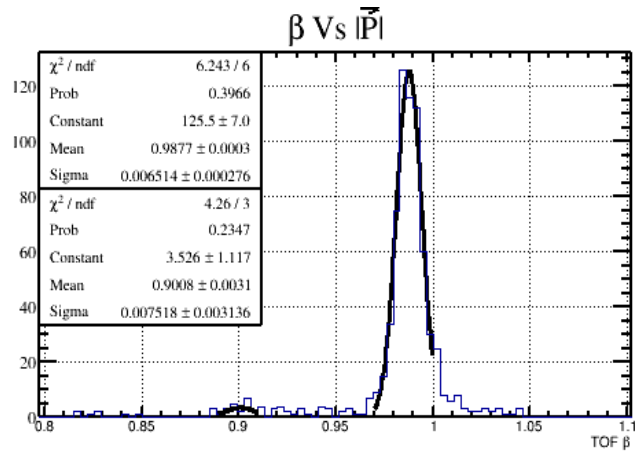
β Vs $|\vec{p}|$



β Vs $|\vec{p}|$

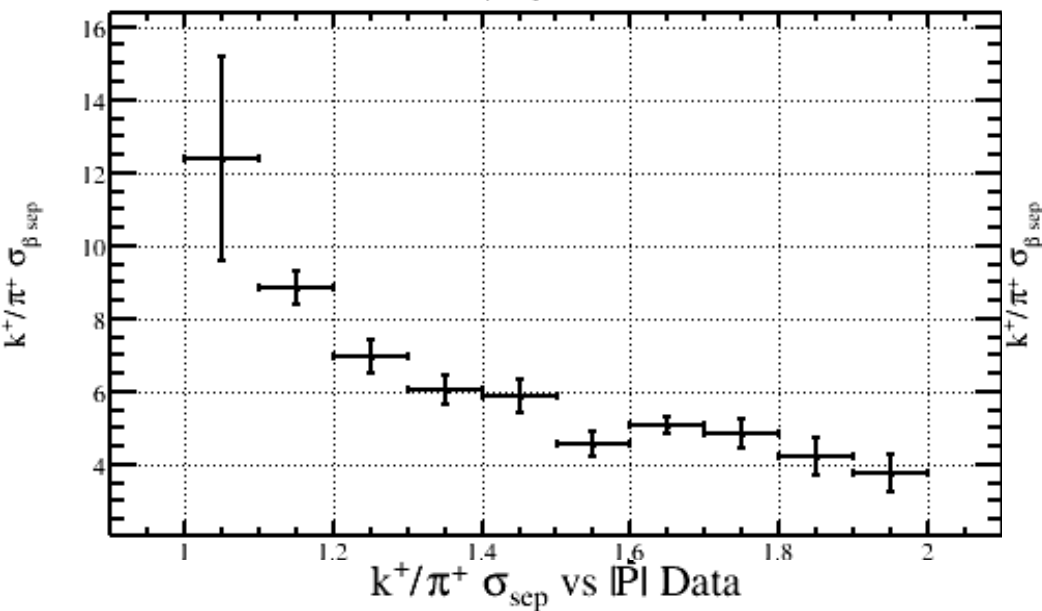


List of 9 Beta Projections (Data)

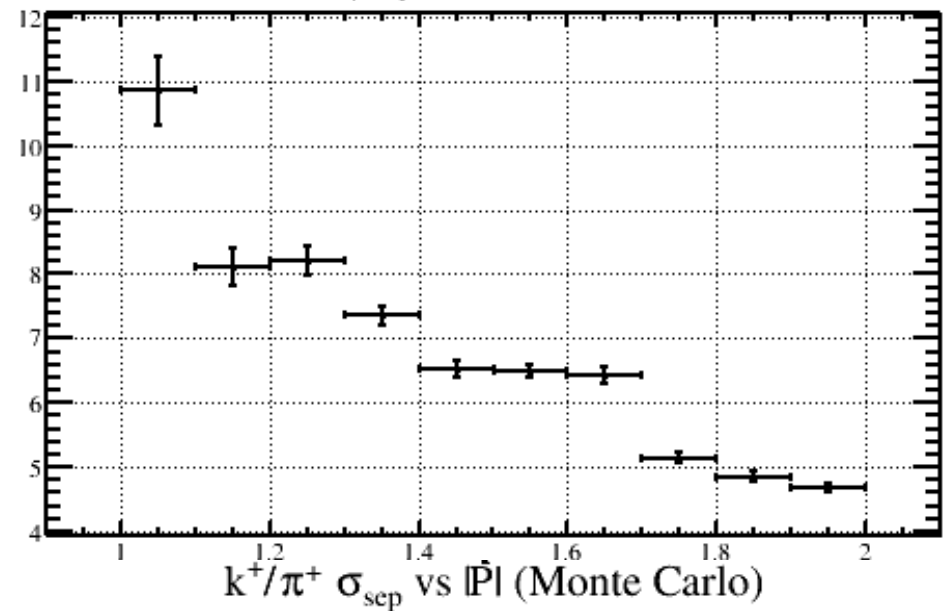


Overview of all Beta Projections:

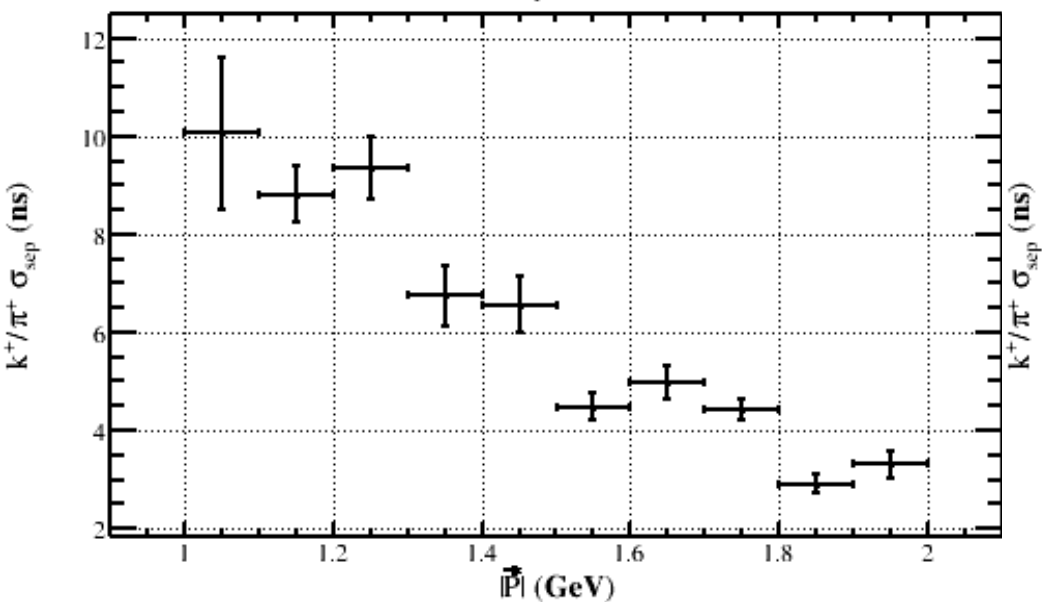
$k^+/\pi^+ \sigma_{\beta \text{ sep}}$ vs $|\vec{p}|$ (Data)



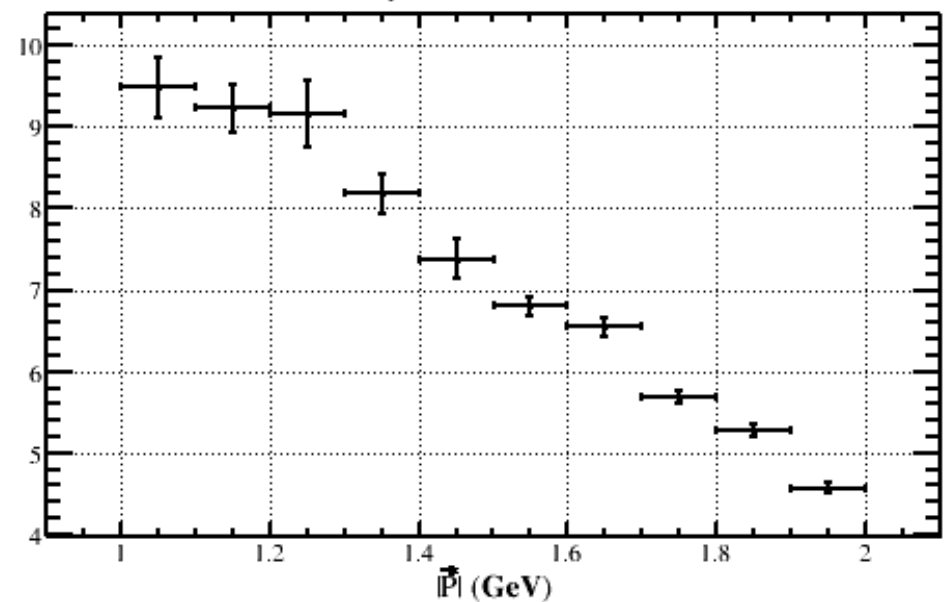
$k^+/\pi^+ \sigma_{\beta \text{ sep}}$ vs $|\vec{p}|$ (Monte Carlo)



$k^+/\pi^+ \sigma_{\text{sep}}$ vs $|\vec{p}|$ Data



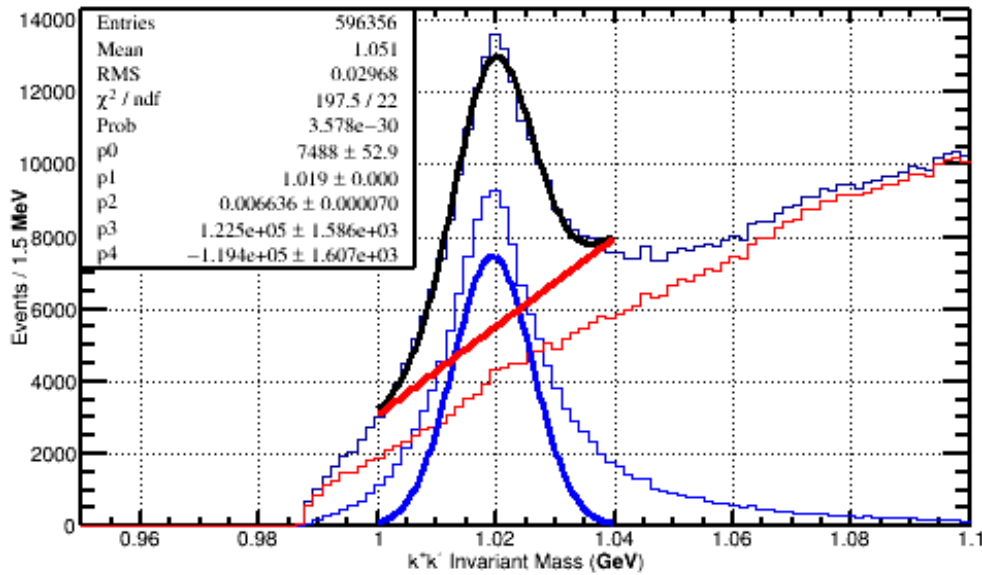
$k^+/\pi^+ \sigma_{\text{sep}}$ vs $|\vec{p}|$ (Monte Carlo)



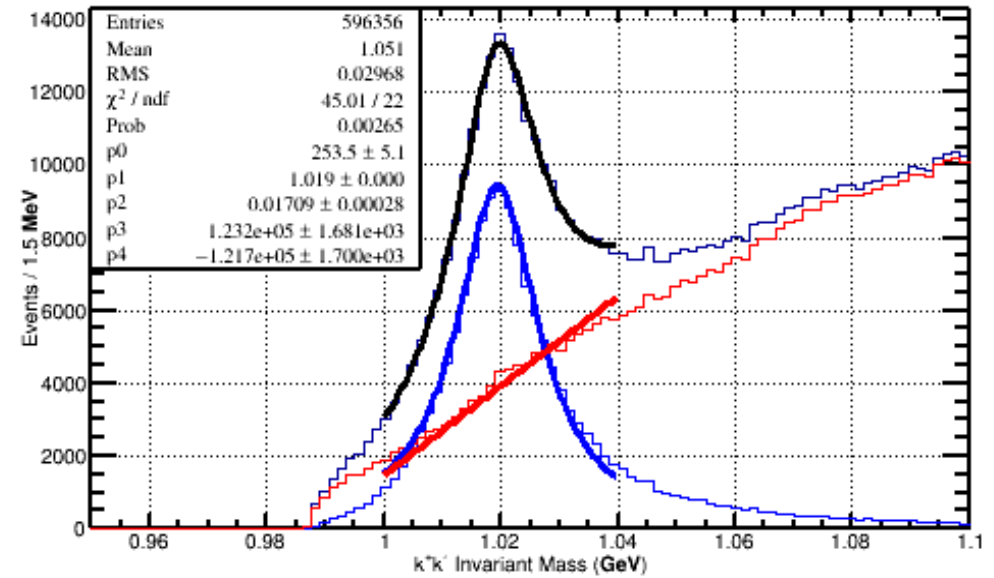
- Ostrovidov: 6.0 sigma @ 1.62 GeV, 4.7 sigma @ 1.90 GeV

K⁺ K⁻ Invariant Mass Study

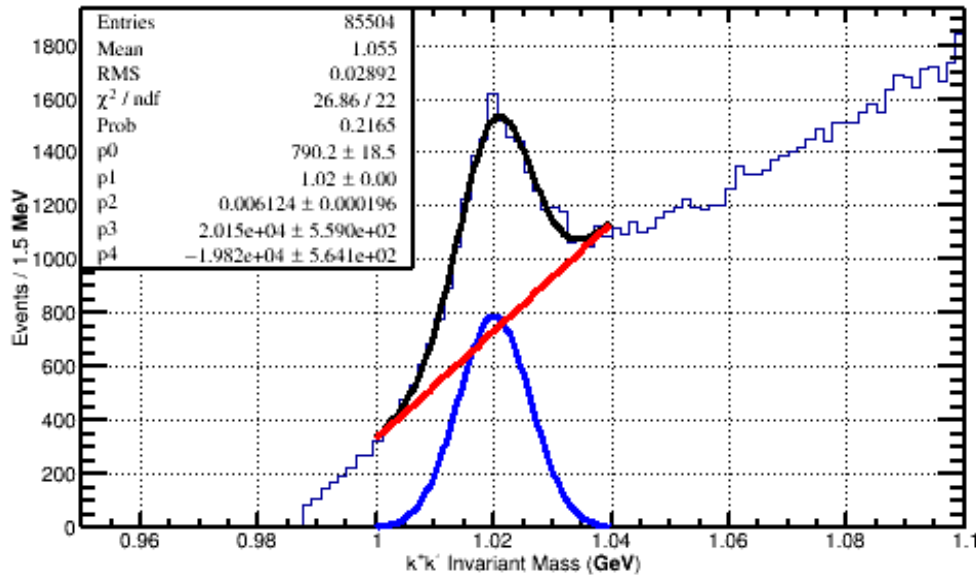
k⁺k⁻ Invariant Mass (Monte Carlo: Gaussian Fit)



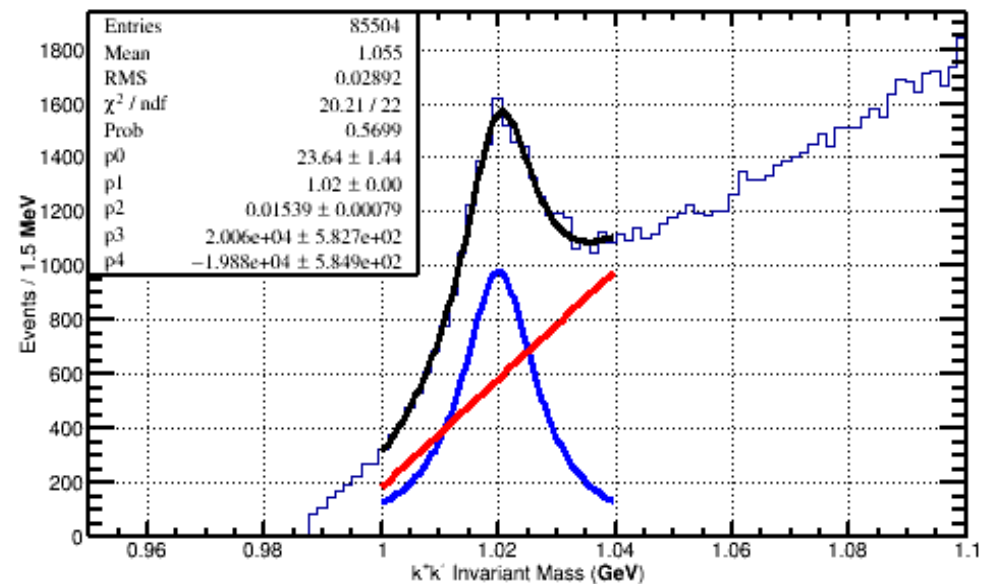
k⁺k⁻ Invariant Mass (Monte Carlo: Breit-Wigner Fit)



k⁺k⁻ Invariant Mass (Data: Gaussian Fit)

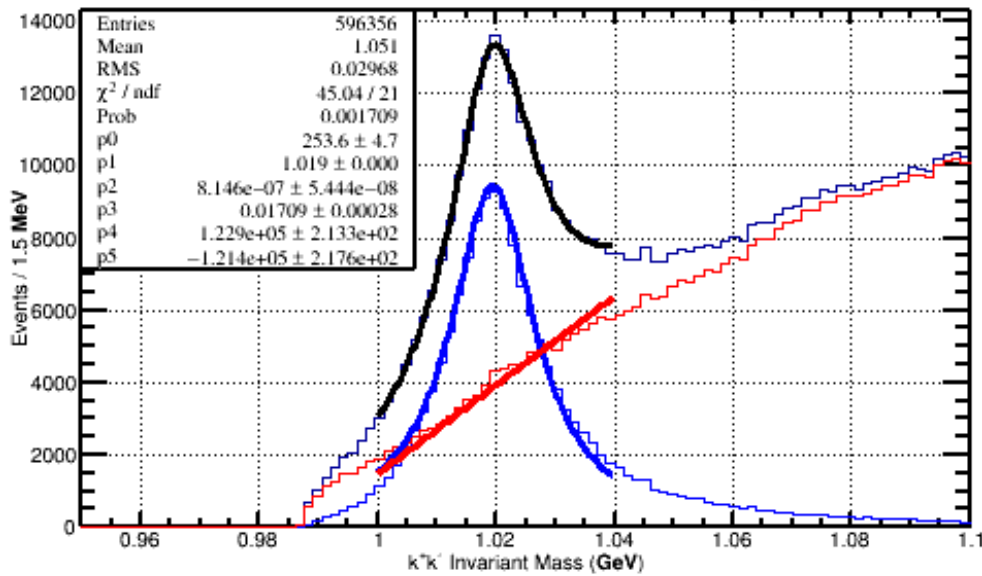


k⁺k⁻ Invariant Mass (Data: Breit-Wigner Fit)

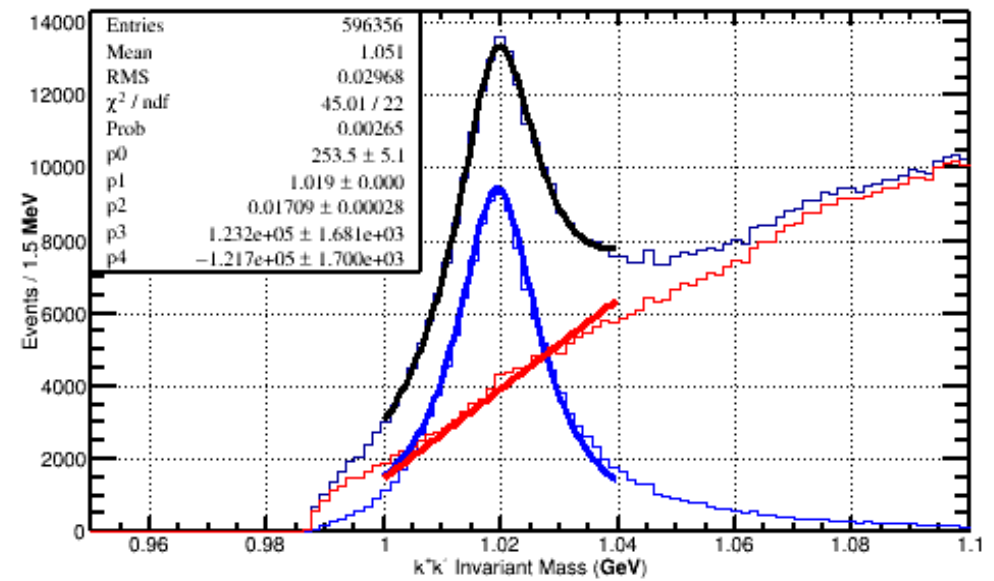


K⁺ K⁻ Invariant Mass Study (cont..)

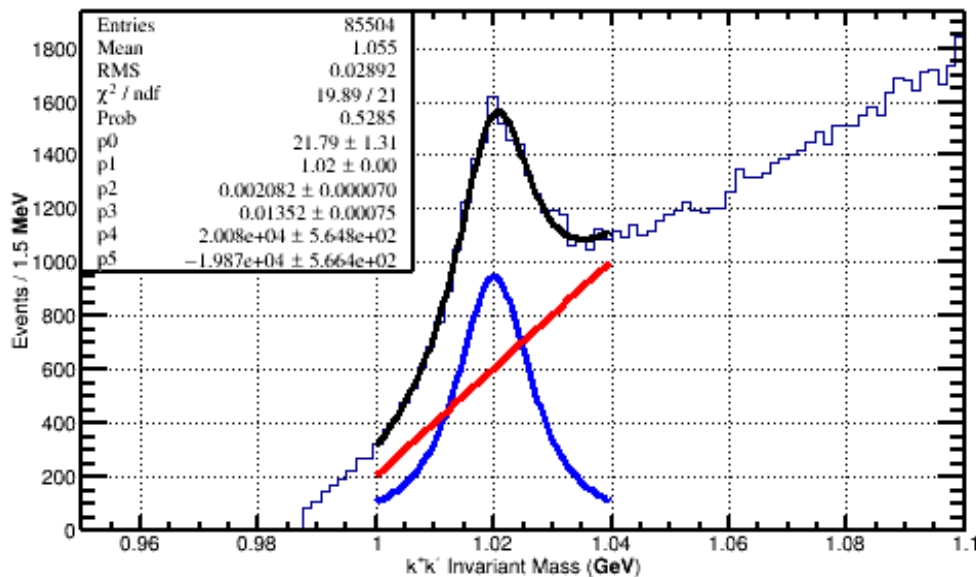
k⁺k⁻ Invariant Mass (Monte Carlo: Voigtian Fit)



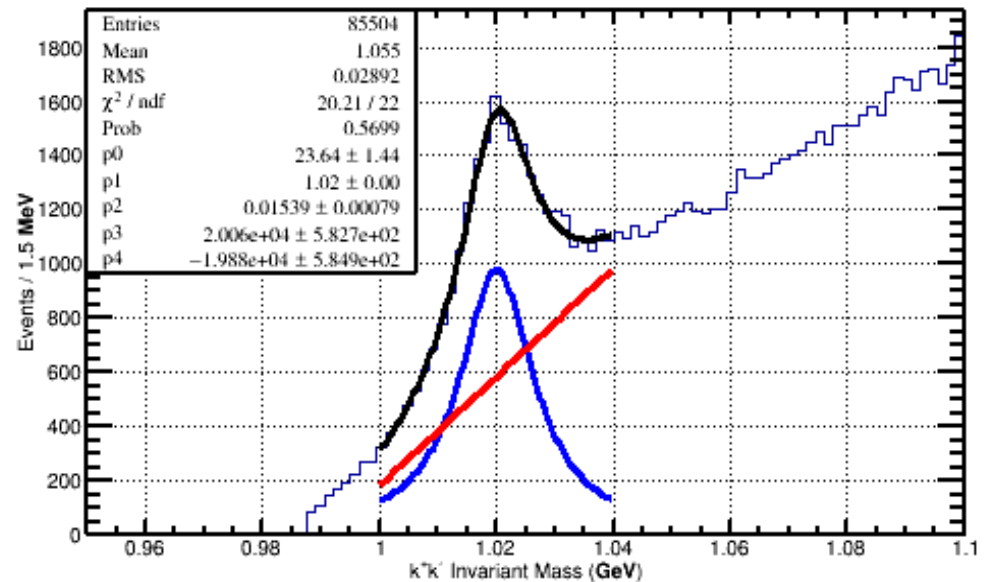
k⁺k⁻ Invariant Mass (Monte Carlo: Breit-Wigner Fit)



k⁺k⁻ Invariant Mass (Data: Voigtian Fit)

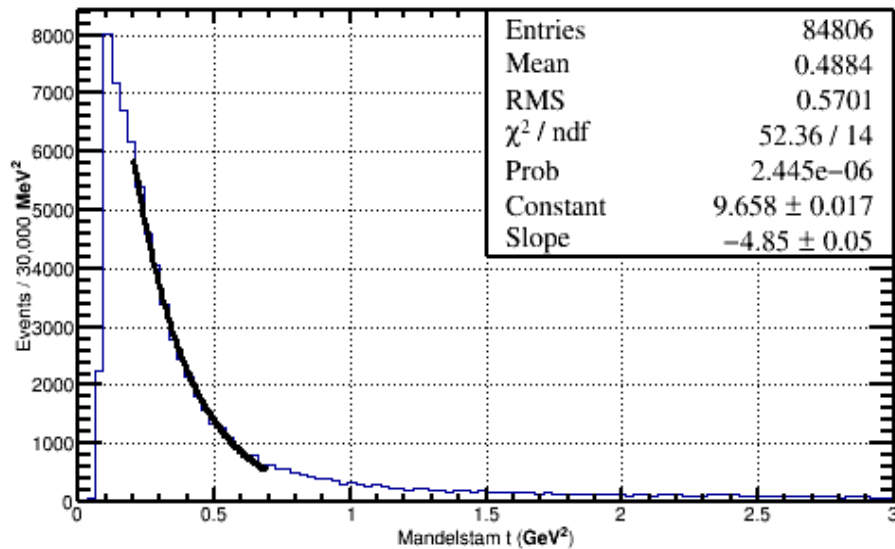


k⁺k⁻ Invariant Mass (Data: Breit-Wigner Fit)

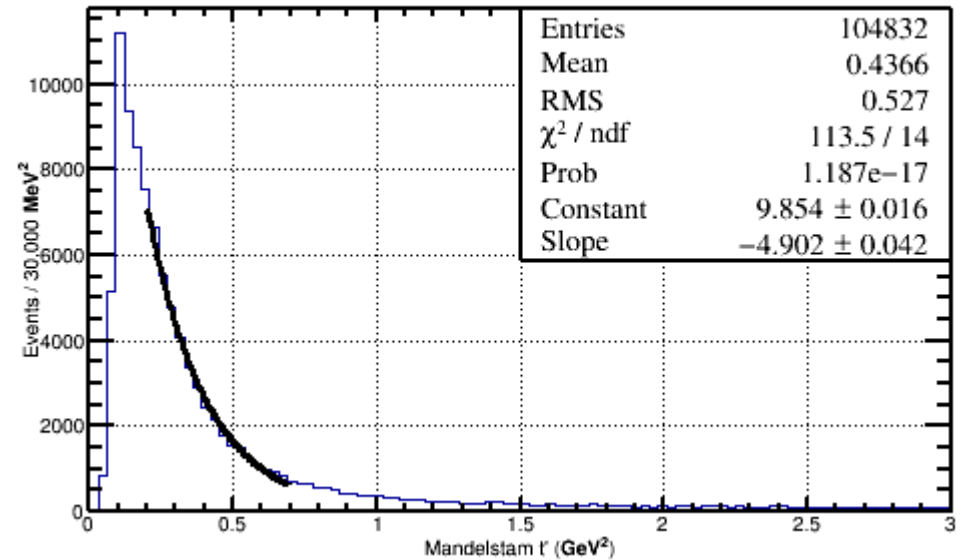


T distributions (Data)

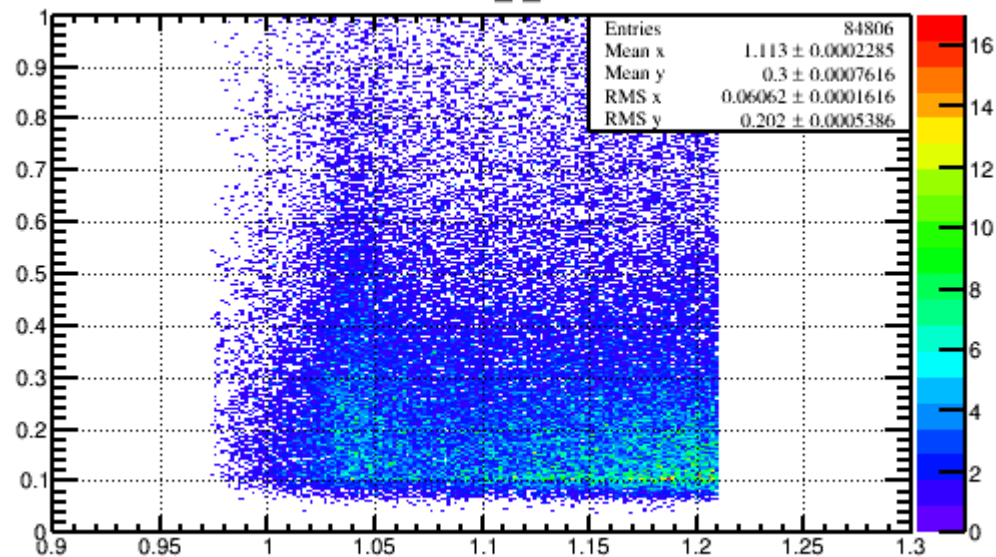
Mandelstam t Distribution (Data: Exponential Fit)



Mandelstam t' Distribution (Data: Exponential Fit)

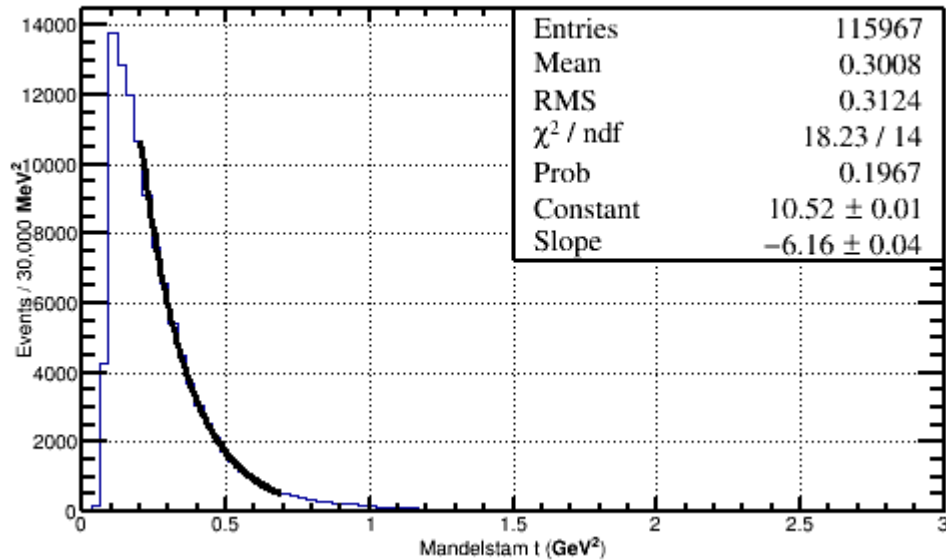


mandelstam_t_MassX

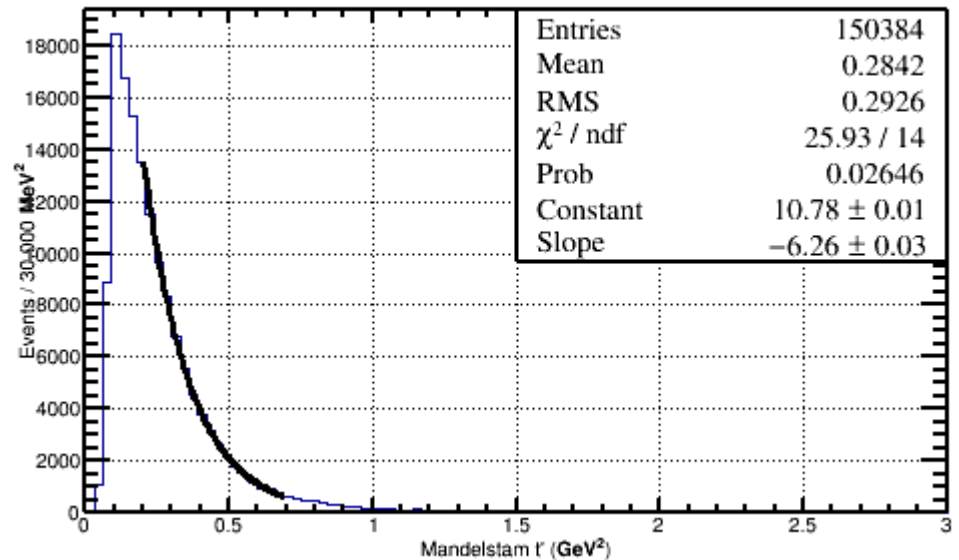


T distributions (MC)

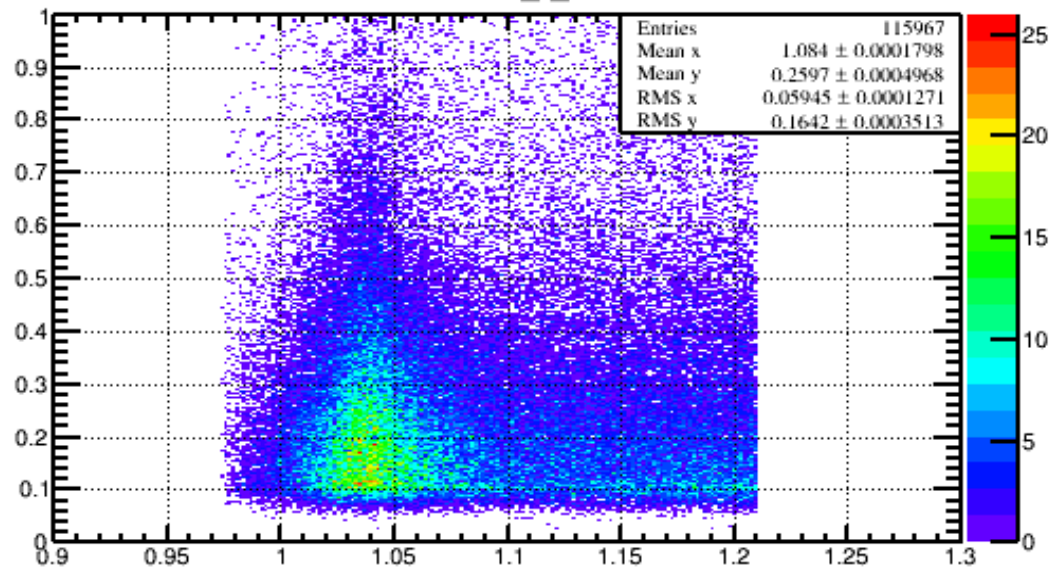
Mandelstam t Distribution (Monte Carlo: Exponential Fit)



Mandelstam t' Distribution (Monte Carlo: Exponential Fit)

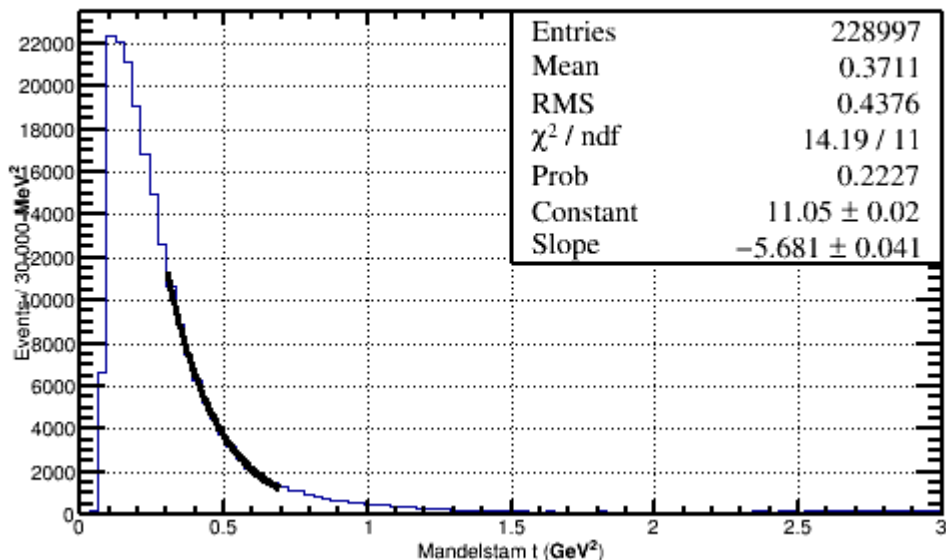


mandelstam_t_MassX

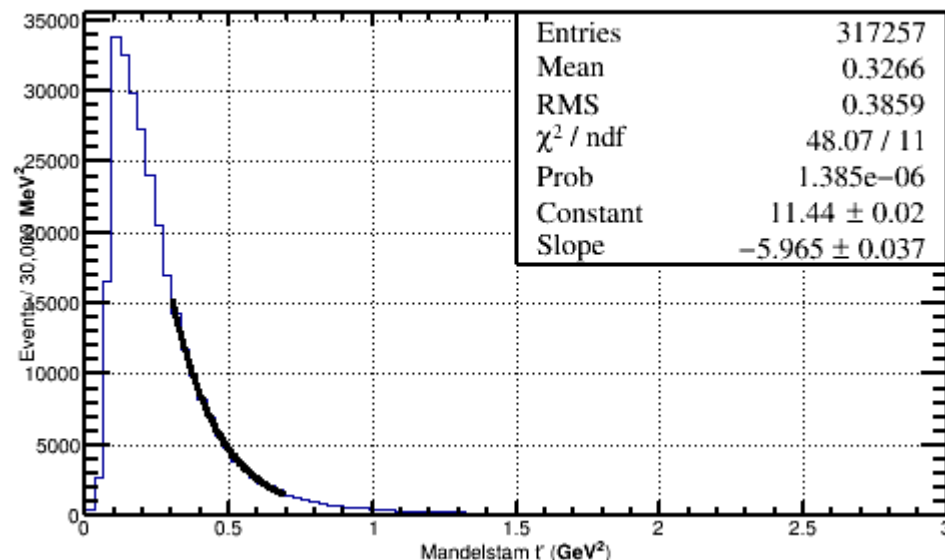


T distributions with phi mass cut

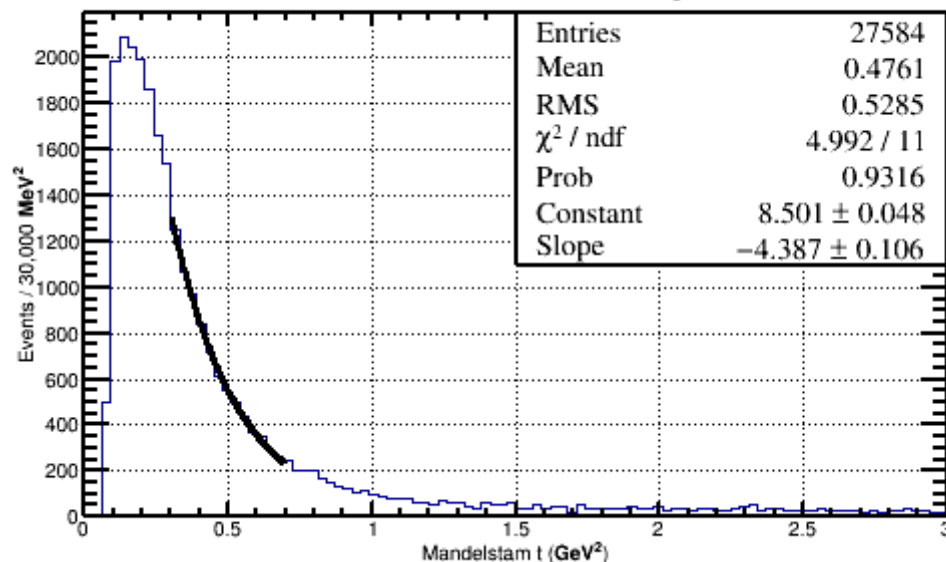
Mandelstam t Distribution (Monte Carlo: Exponential Fit)



Mandelstam t' Distribution (Monte Carlo: Exponential Fit)



Mandelstam t Distribution (Data: Exponential Fit)



Mandelstam t' Distribution (Data: Exponential Fit)

