Preliminary Studies of Tracking Efficiencies

$\gamma p \to \pi^+\pi^- p$

$\gamma p \to \pi^+\pi^-\pi^+\pi^- p$

Alexander Austregesilo

Workfest
May 17, 2018

Tools and Methods

Jefferson Lab
Thomas Jefferson National Accelerator Facility

- Plugin `trackeff_missing`:
  - 2π and 4π production with missing proton or $\pi^{\pm}$
  - KinFit for missing particle 'truth' and covariance matrix
- P. Mattione's tracking efficiency scripts

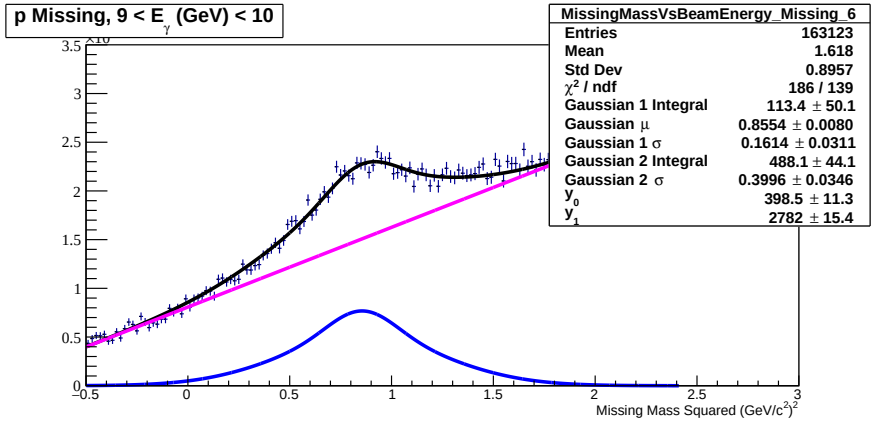
  `https://halldsvn.jlab.org/repos/trunk/home/pmatt/scripts_trackeff/`
  - Determine mean and sigma of missing mass
  - Determine resolutions: $\Delta p, \Delta\theta, \Delta\phi$ vs. p, θ, ϕ
  - Subtract accidentals and sidebands
  - All in beam energy bins (here 1 GeV)
  - Compute tracking efficiency (vs. p, θ, ϕ) summed over E_γ

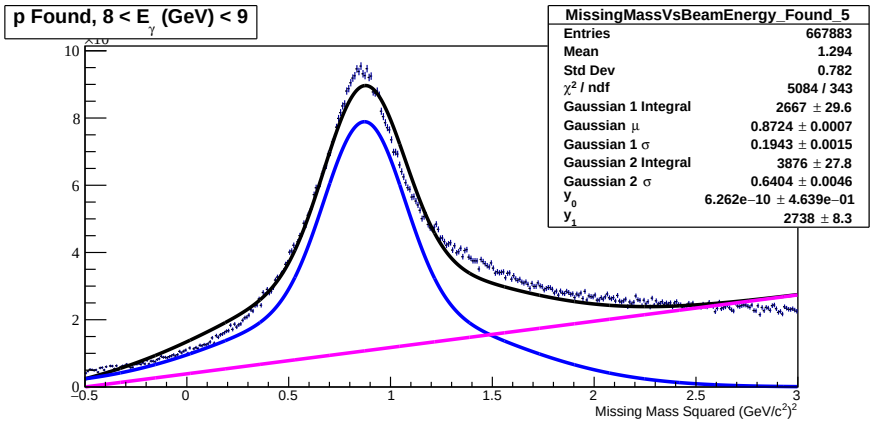
Missing Mass

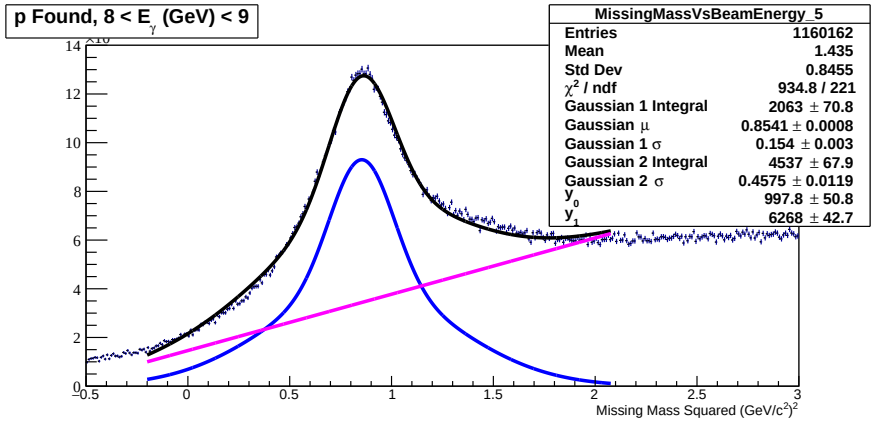
Data: Proton in 4π

Jefferson Lab
Thomas Jefferson National Accelerator Facility

- Problem: large background
- Fit *missing*, *found* separately
- No enough signal in *missing*
- Fit found + missing





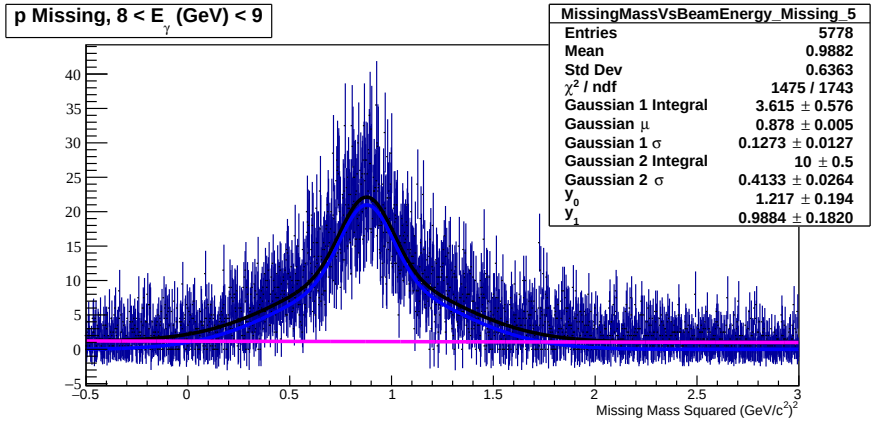


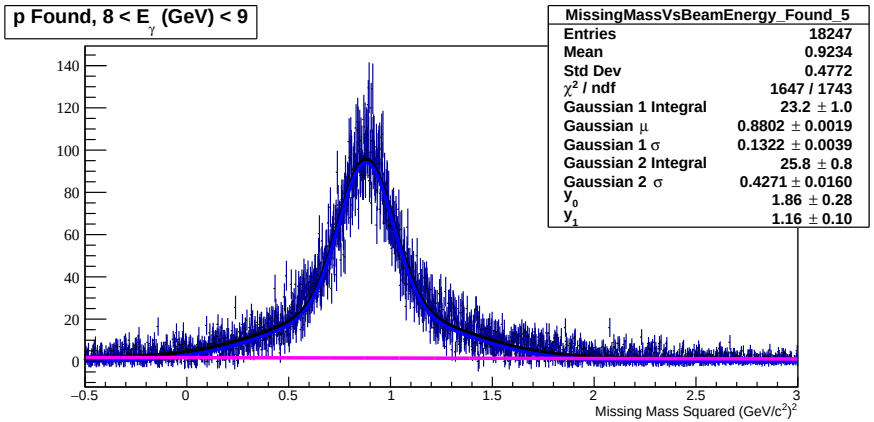
Missing Mass

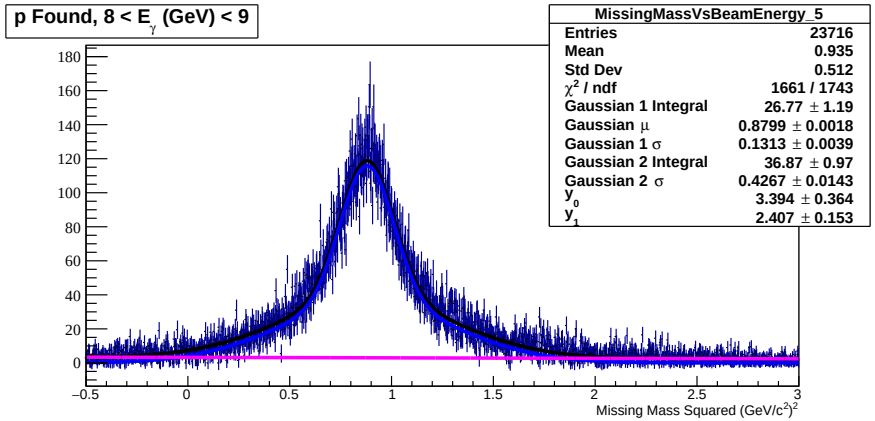
MC: Proton in 4π

Jefferson Lab
Thomas Jefferson National Accelerator Facility

- Level of background different
- Fit *missing*, *found* separately
- No enough signal in *missing*
- Fit found + missing





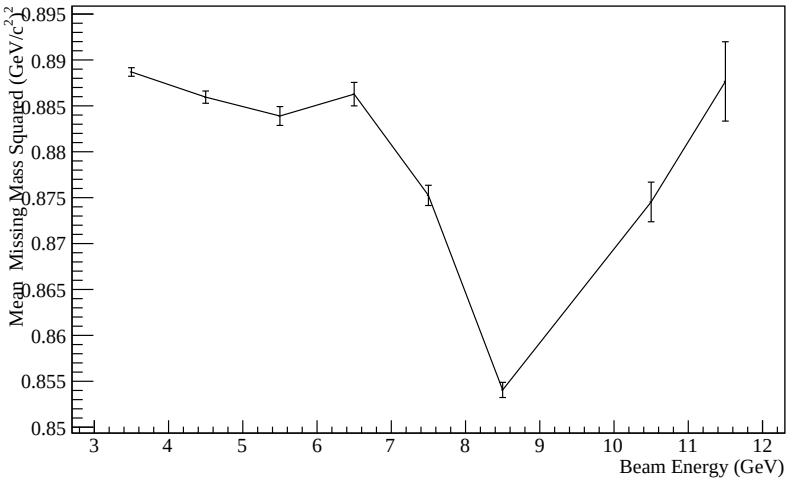


Missing Mass

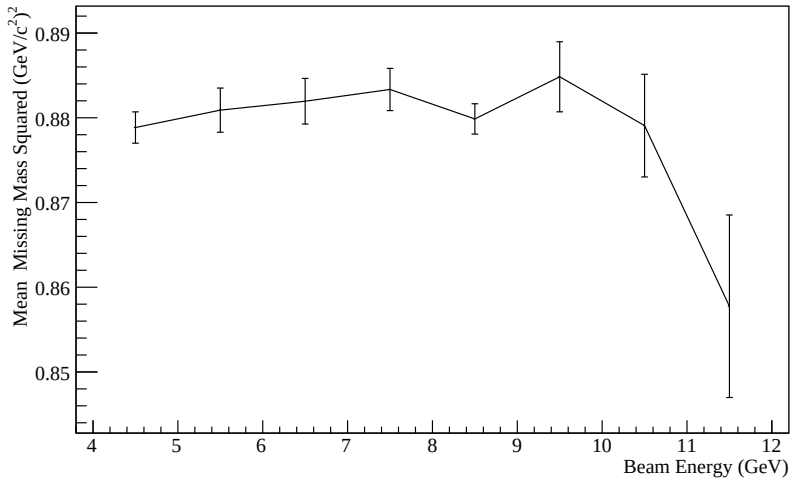
Data vs MC

Jefferson Lab
Thomas Jefferson National Accelerator Facility

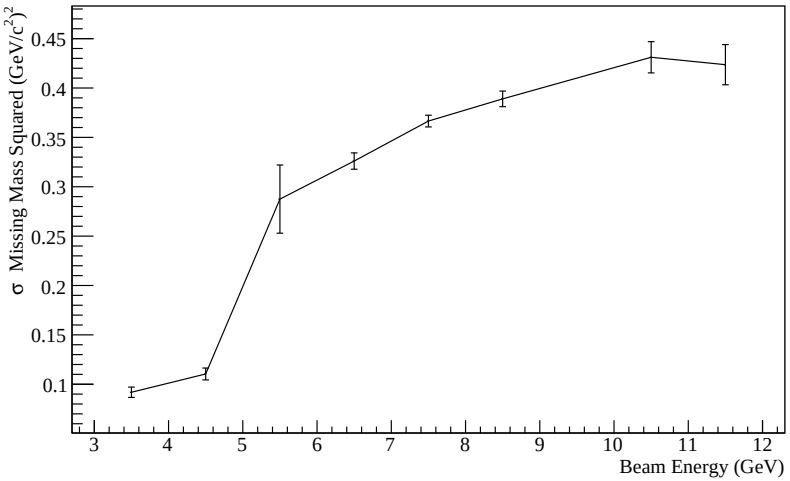
p Found



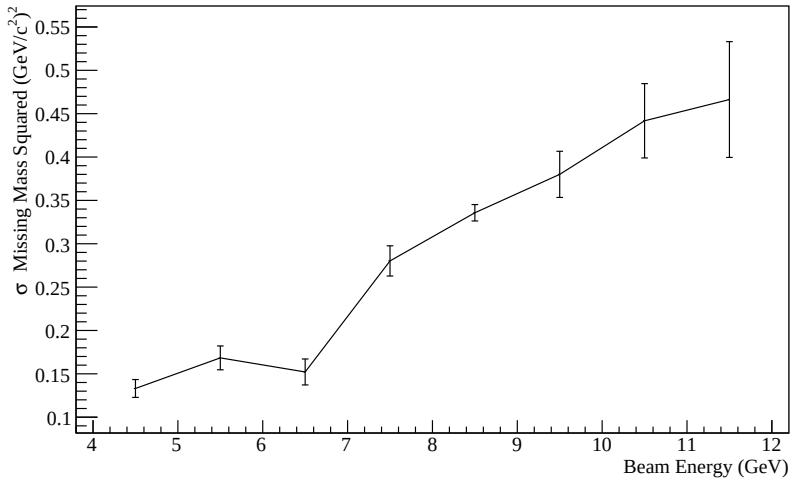
p Found



p Found



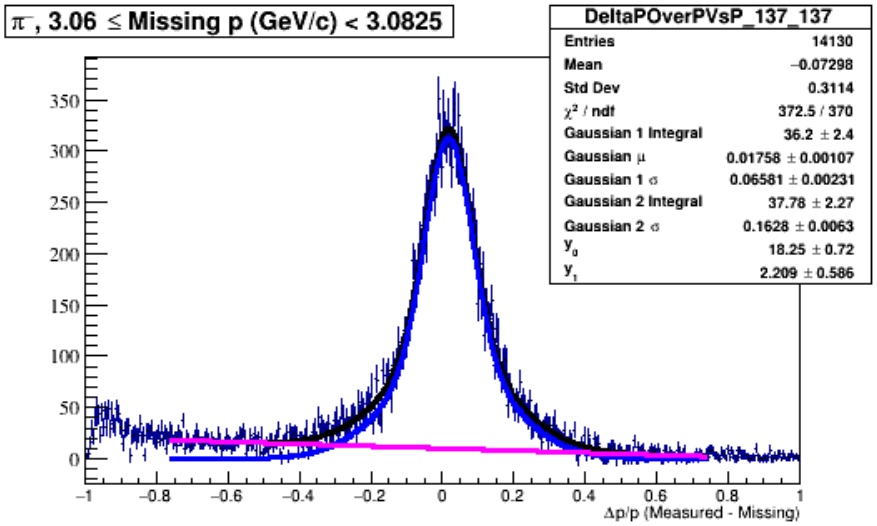
p Found

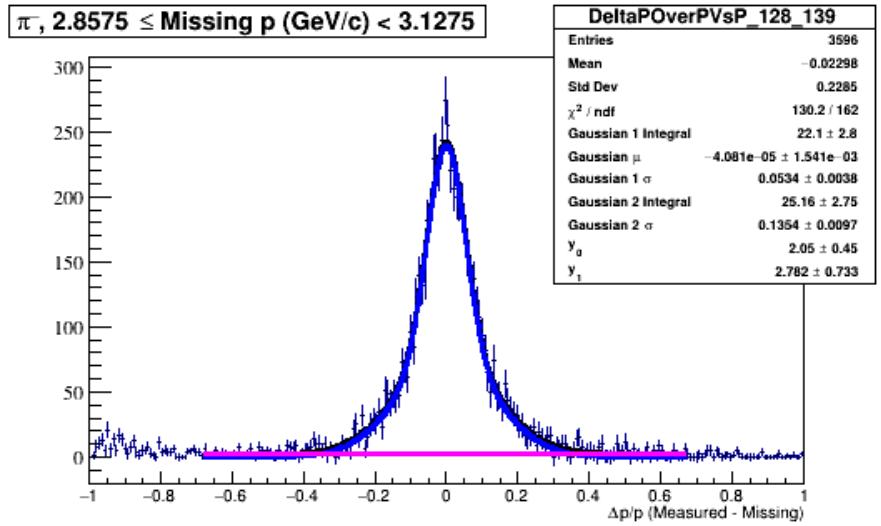


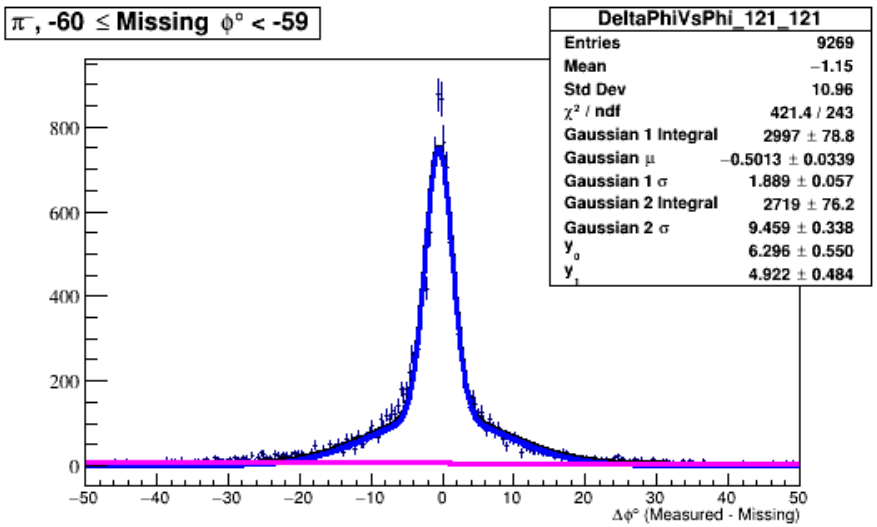
Resolution

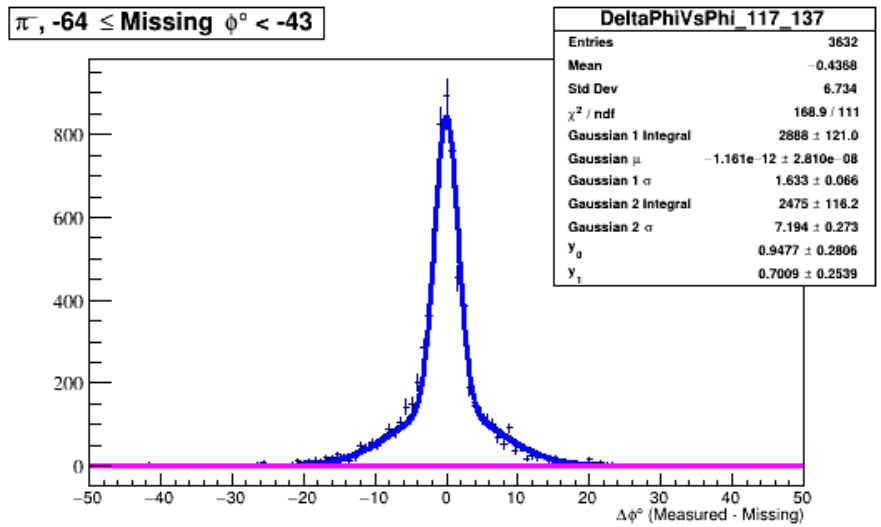
Data vs MC

Jefferson Lab
Thomas Jefferson National Accelerator Facility



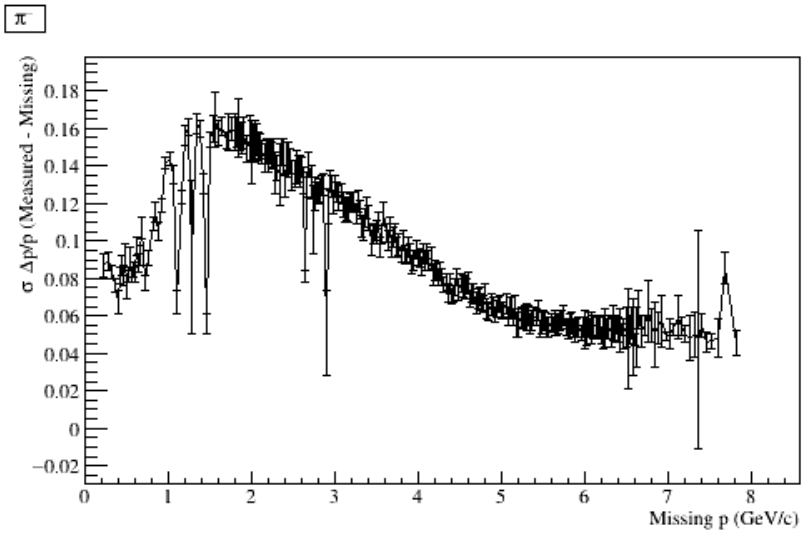


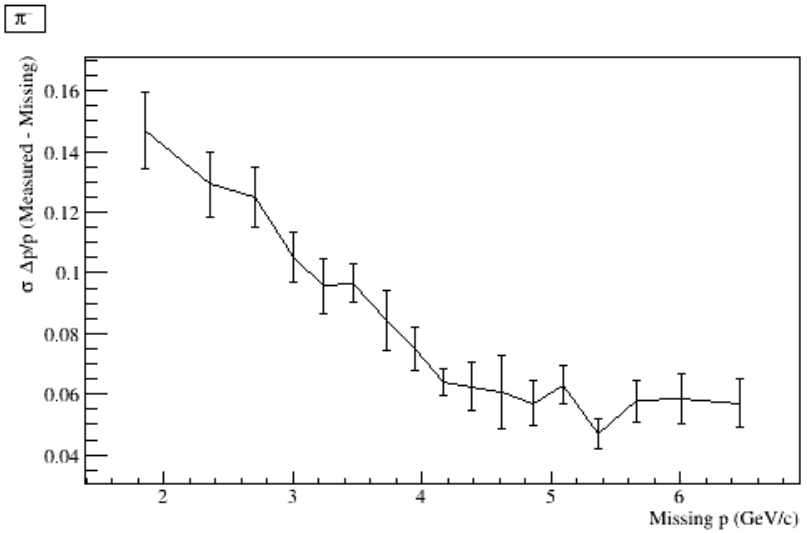


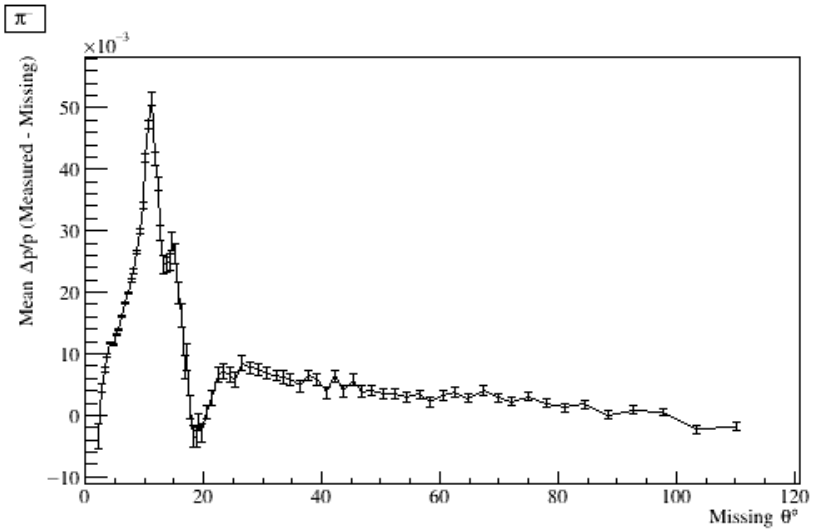


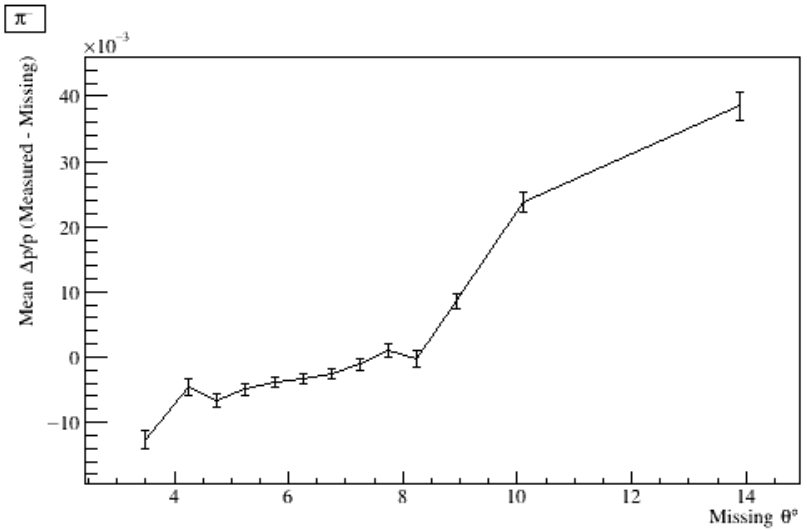
Resolution
Data vs MC

Jefferson Lab
Thomas Jefferson National Accelerator Facility





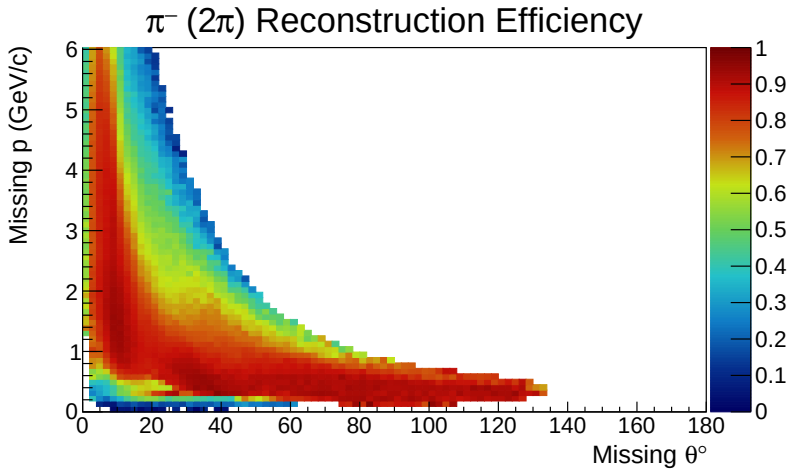


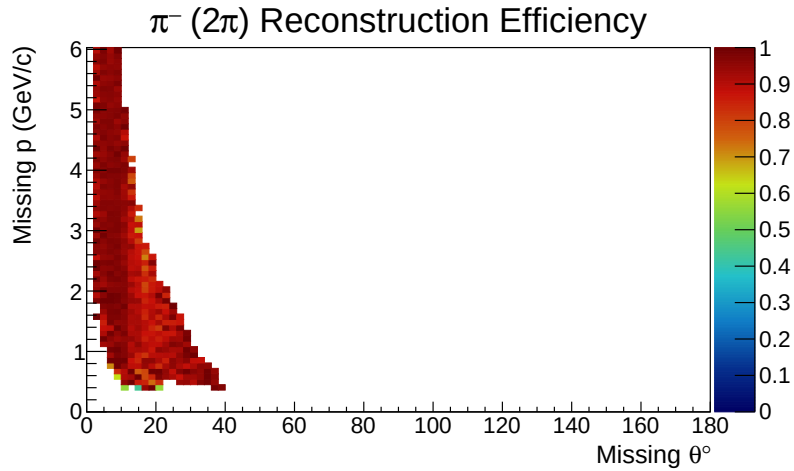


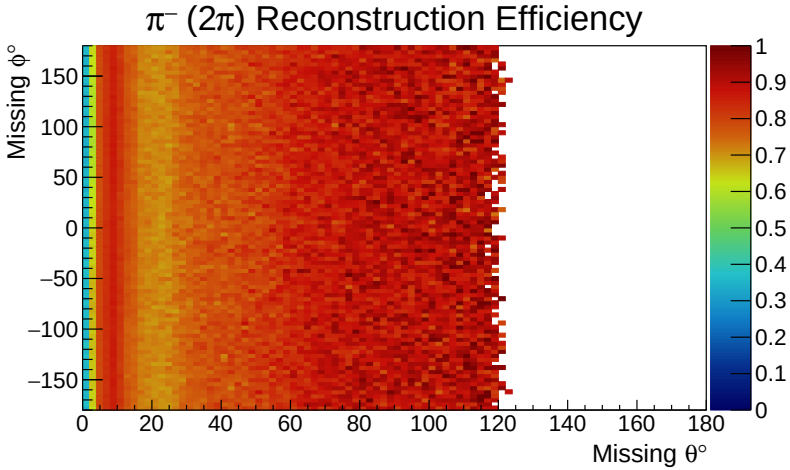
Tracking Efficiency

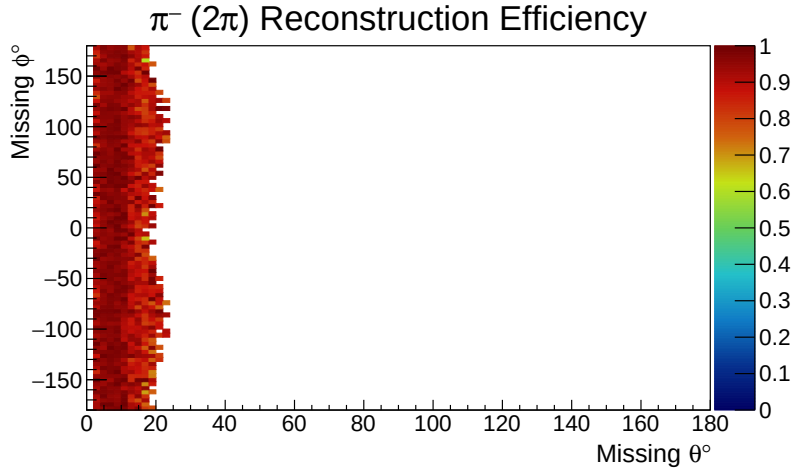
Data vs MC

Jefferson Lab
Thomas Jefferson National Accelerator Facility





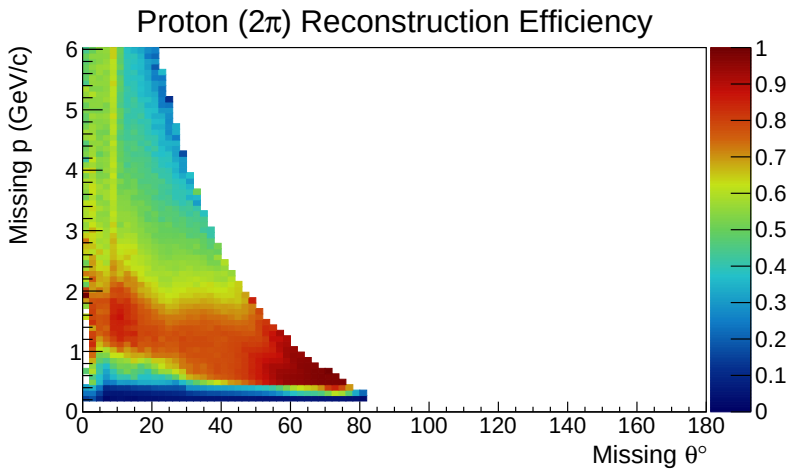


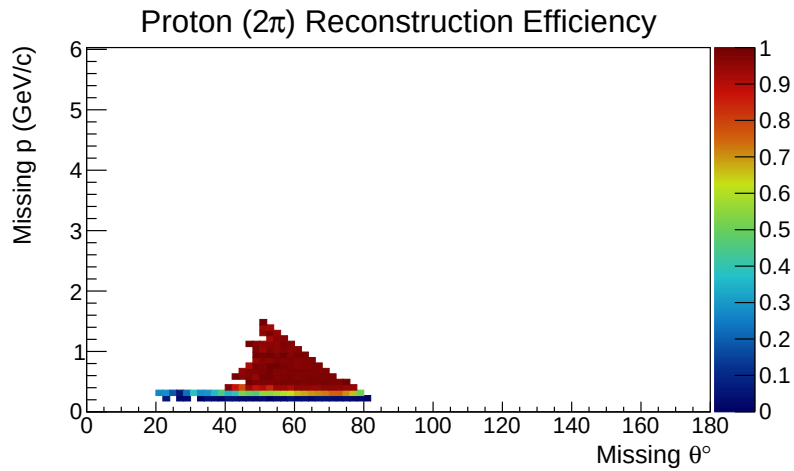


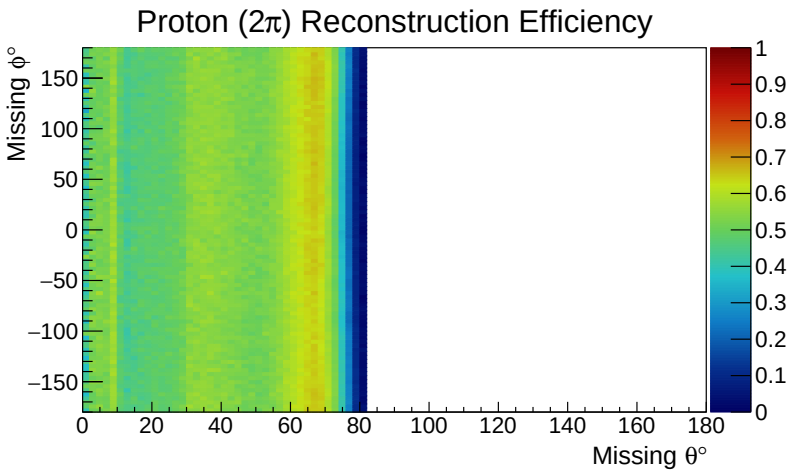
Tracking Efficiency

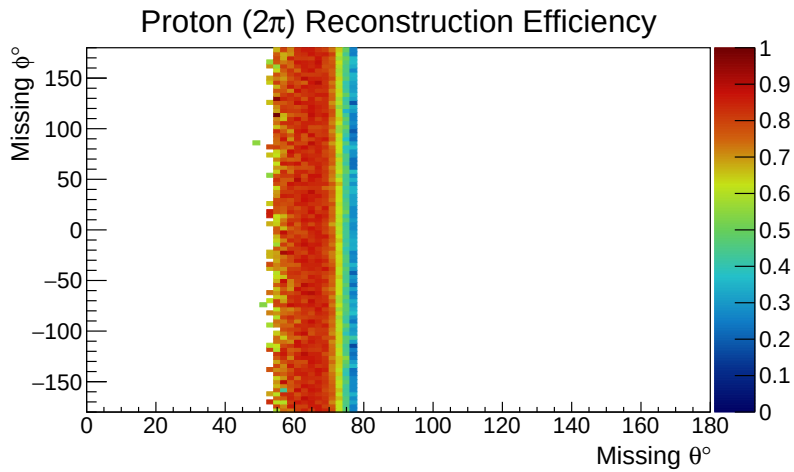
Data vs MC

Jefferson Lab
Thomas Jefferson National Accelerator Facility









Tracking Efficiency

Data vs MC

Jefferson Lab
Thomas Jefferson National Accelerator Facility