

ρ Meson Spin-Density Matrix Elements

$$\gamma p \rightarrow \rho(770)p$$

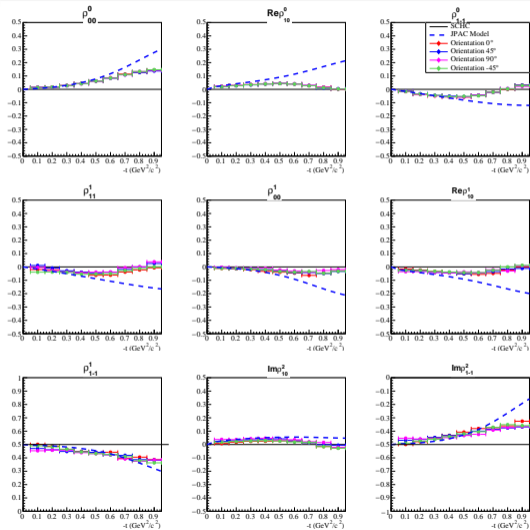
Alexander Austregesilo

Amplitude Analysis WG Meeting
November 16, 2020

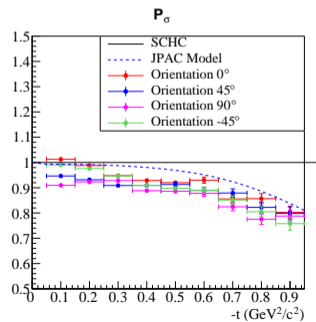


Problem Presented in May

$$\gamma p \rightarrow \rho(770) p$$



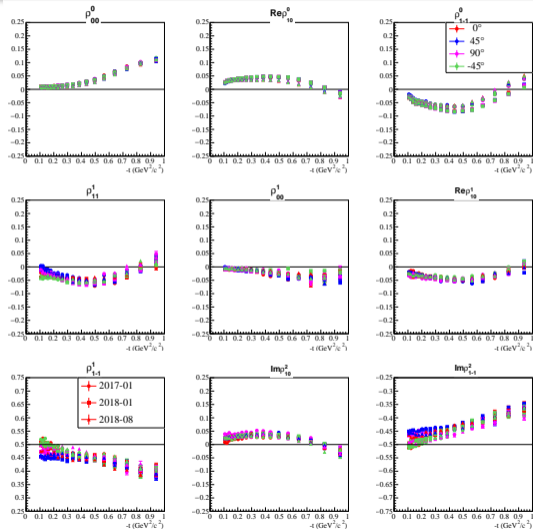
- 0.1 GeV²/c² bin width in t
- Statistical errors from Minuit
- Discrepancy between 0° and 90°
- Largest for small t



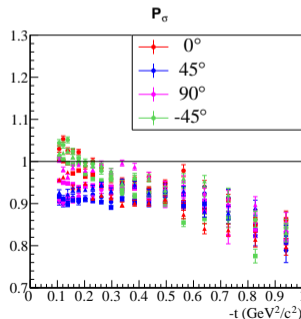
$$P_{\sigma} = 2\rho_{1-1}^1 - \rho_{00}^1$$

New and Updated Results

$\gamma p \rightarrow \rho(770)\rho$



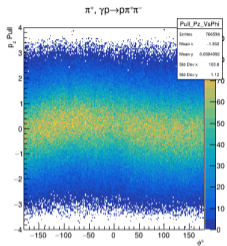
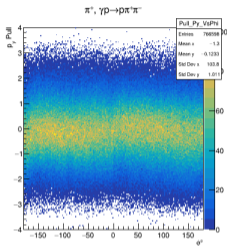
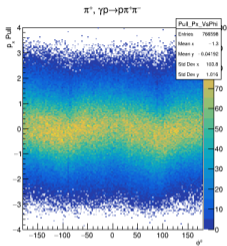
- 3 run periods
- Logarithmic binning
- Zoomed in y-axis
- Discrepancy for orientations remains



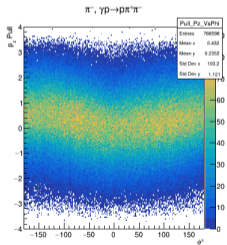
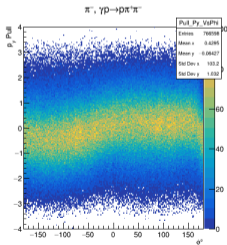
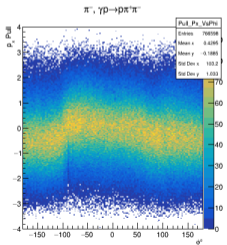
$$P_{\sigma} = 2\rho_{1-1}^1 - \rho_{00}^1$$

Pull Distributions

As a function of ϕ



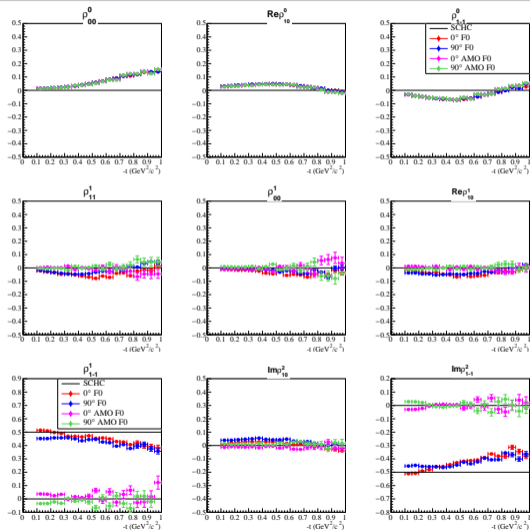
π^+



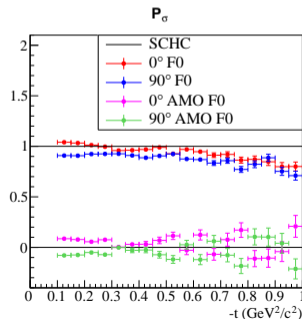
π^-

No Kinematic Fit

$$\gamma p \rightarrow \rho(770) p$$



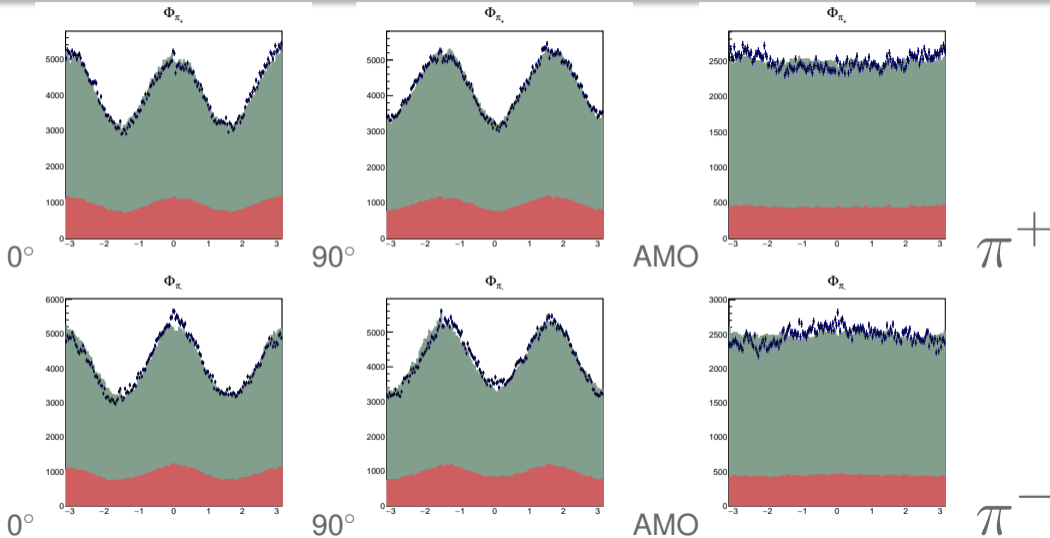
- New trees without KF
- Bias visible in AMO
- Dependent on orientation



$$P_\sigma = 2\rho_{1-1}^1 - \rho_{00}^1$$

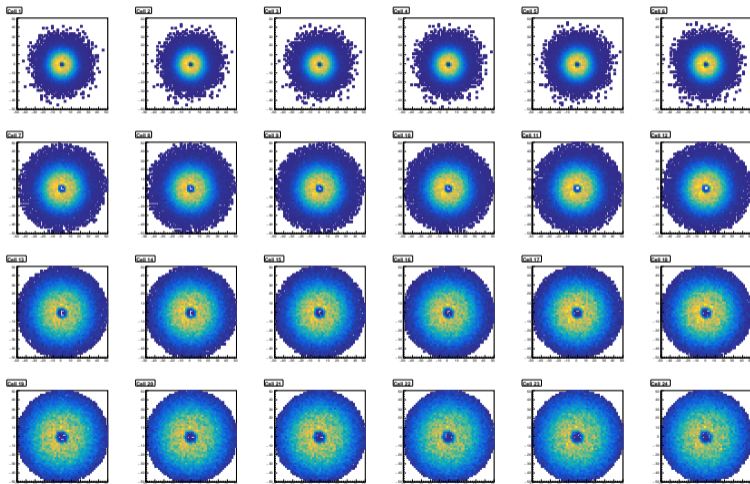
ϕ Distributions

for 0° , 90° and amorphous



Pion Track Distributions

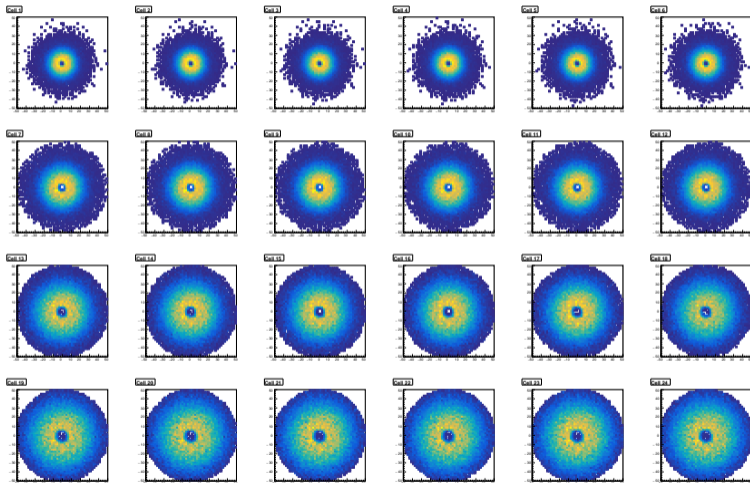
by charge (run 30739, amorphous)



π^+

Pion Track Distributions

by charge (run 30739, amorphous)



π^-

Summary

- Study tracking bias in more detail to understand the source of the problem, extrapolate to TOF/FCal
- Play with detector positions in MC to reproduce effect in simulation (Simon)
- Separate alignment for oppositely charged tracks (Keigo)
- Additional systematic studies (Jamie Fitches)