ρ Meson Spin-Density Matrix Elements

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

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Amplitude Analysis WG Meeting
November 16, 2020

Problem Presented in May

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

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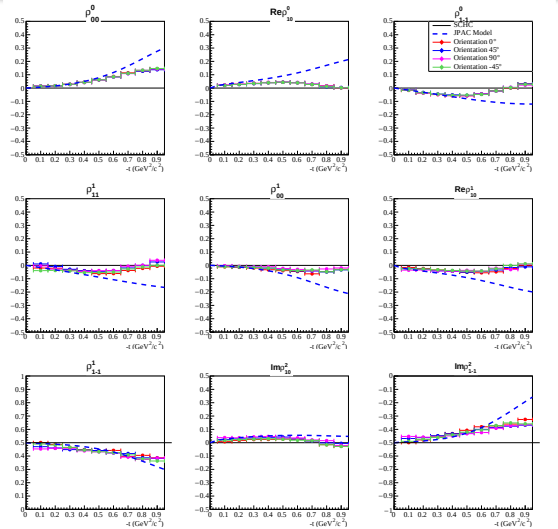
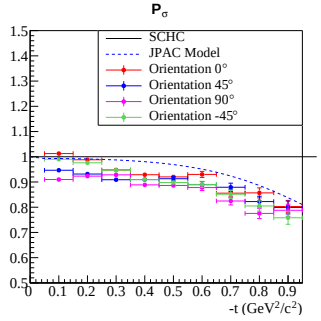


- 0.1 GeV$^2/c^2$ bin width in t
- Statistical errors from Minuit
- Discrepancy between 0° and 90°
- Largest for small t



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

Pull Distributions

As a function of ϕ

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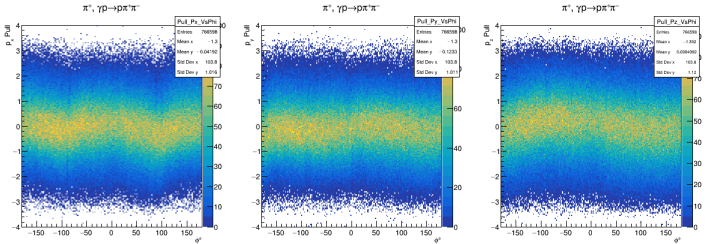
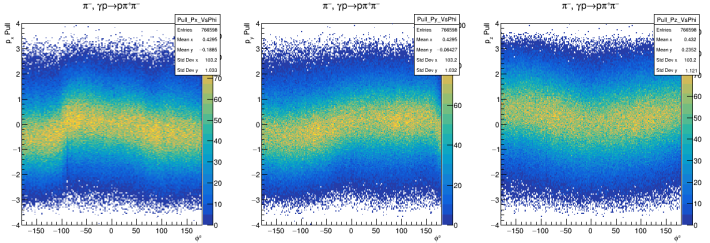


π^+



π^-

No Kinematic Fit

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

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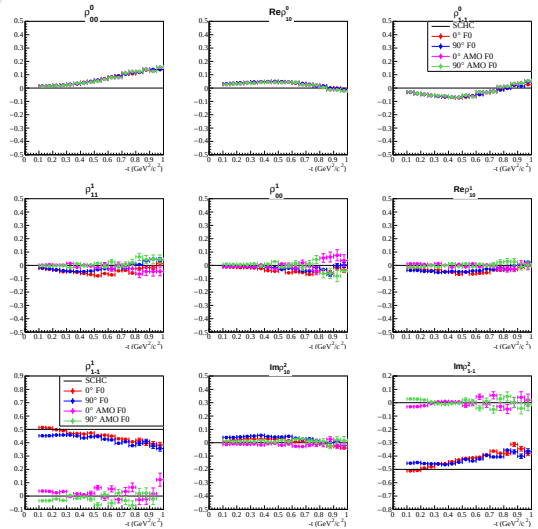
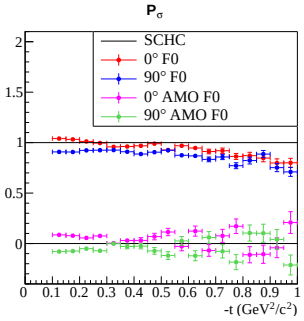


- New trees without KF
- Bias visible in AMO
- Dependent on orientation



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

ϕ Distributions

for 0°, 90° and amorphous

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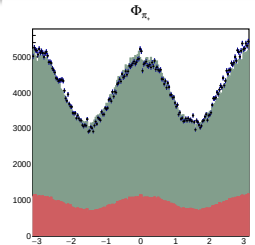
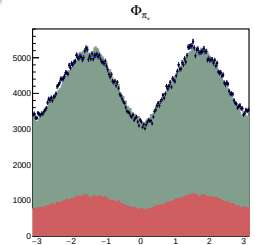
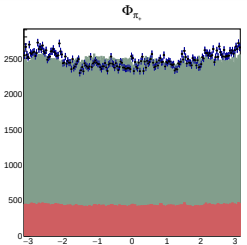


0°

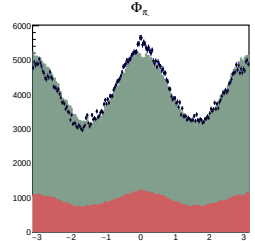


90°

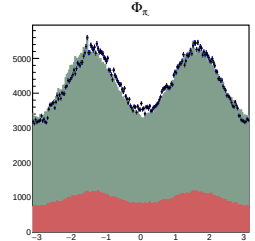


AMO

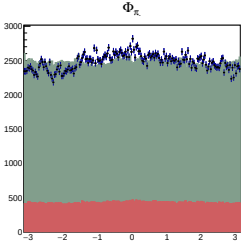
π^+



0°



90°



AMO

π^-

Pion Track Distributions

by charge (run 30730, 90°)

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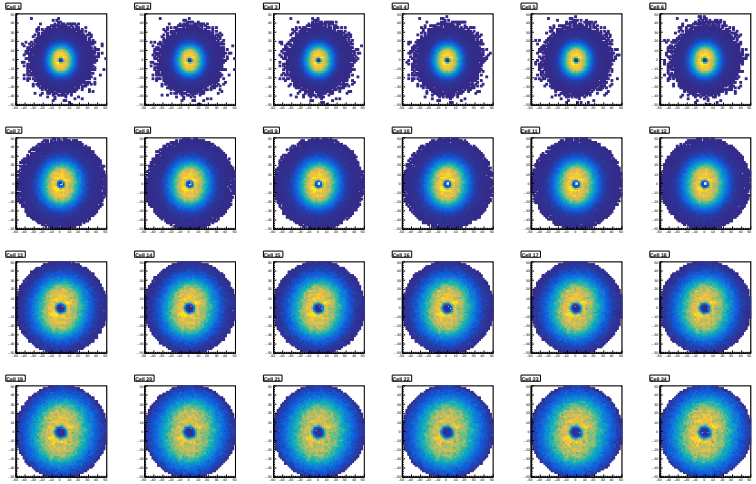
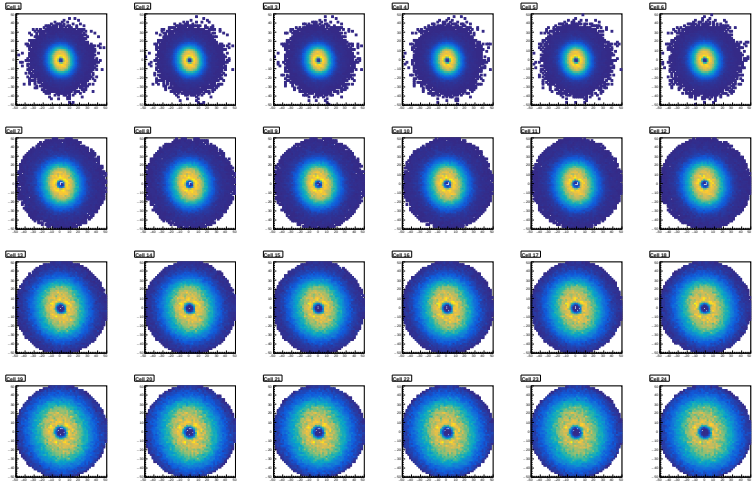


π^+

Pion Track Distributions

by charge (run 30730, 90°)



π^-

Next Steps

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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)