μ-Channel Analysis Progress

Alicia Postuma

University of Regina
KaonLT Experiment, Jefferson Lab Hall C

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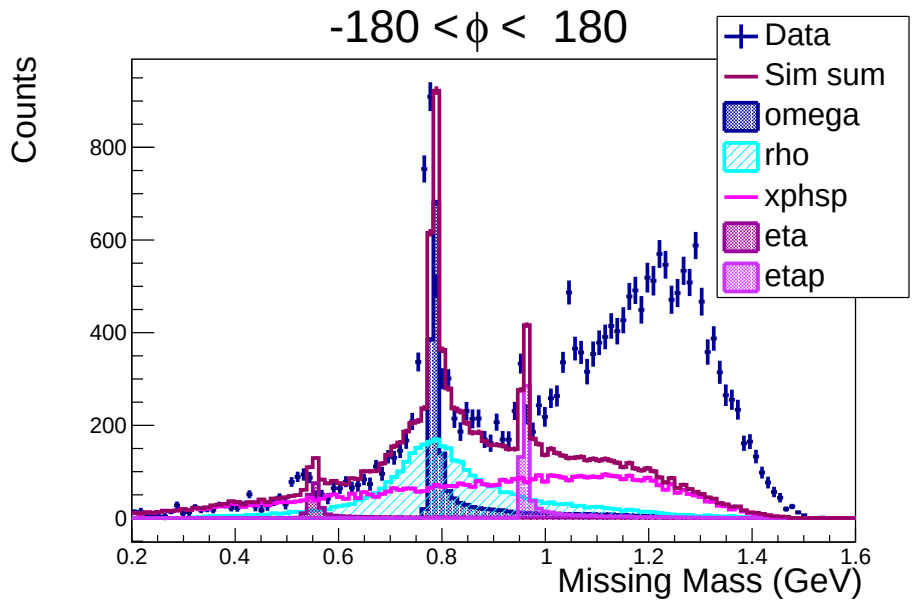
University of Regina

Recap

- Met with Henry at JLab: discussion of Pythia
- Met with Bill at JLab: detailed discussion of u-channel physics as a whole, as well as a discussion of my background issue
- Working on modelling semi-inclusive background in my data
- Two approaches: modify Xphasespace model in SIMC or use Pythia



Xphasespace in SIMC

- Labelled as 2π in Bill's thesis, he claims adding a 3rd pion should reproduce the shape of my background
- According to the Ambrosewicz thesis, the model generates events with uniform sampling of missing mass M_X subject to constraint $M_X \leq W - M_p$
- To replicate data t-dependence, a Lorentz-invariant phase space factor was used in calculating the weights

Xphasespace Weights in the Ambrosewitz Thesis

Start with (3.26):

$$\frac{d\sigma_v}{d\Omega_x^{CM} dM_x} = \frac{1}{16\pi^2} \frac{1}{W|\vec{q}^{CM}|} \left(\frac{d^2R}{d\Omega_x dM_x} \right)$$

"which is a conventional DXS for a 2-body process in their CM frame in the case where $|<f|T|i>|^2 = 1$." Then make use of (C.28)

$$\frac{d^2R}{d\Omega_x dM_x} = 2M_x \frac{d^2R_2}{d\Omega_x dM_x^2} = \frac{1}{2} \frac{M_x}{W} p_x$$

to get (3.27)

$$\frac{d\sigma_v}{d\Omega_x^{CM} dM_x} = \frac{1}{32\pi^2} \frac{M_x}{|\vec{q}^{CM}|} \frac{p_x^{CM}}{W^2}$$

This is implemented in SIMC as

$$ntup\%sigcm = 1./(32. * pi * pi) * mass/q\_phot\_CM * p\_cm/invm * *2$$

Pythia

- Pythia generates a text file with event kinematics:
  HMS p_x p_y p_z E v_z SHMS p_x p_y p_z E v_z Weight
- A modified version of SIMC reads these kinematics as input
- Problem 1: SIMC runs with zero successes, producing empty files
- Problem 2: I was running two different kinds of files for debugging, which had different issues, and caused confusion

Test	Read Pythia file into SIMC	Read SIMC output into SIMC
Problem	Mismatch in Pythia output vs .inp file spectrometer angles, momentum	File event reading assumes input is in lab frame, whereas SIMC output is in spect. frame
Solution	Run python script to confirm true central momentum and angle	Set angles to 0 in .inp file