KaonLTMeeting February 8th, 2024 Richard Trotta

Overview

- 1. SIMC Weight
- 2. SIMC MM
- 3. MM PID Analysis
- 4. MM cut: Yield Comparison

1) SIMC Weight

- Problem: In order to get Ydata/Ysimc to be even close to unity I need to divide the SIMC weight by 10⁶
- Solution: I was applying the weight for the histograms but not binned data
 - Typo from rewriting binning script, D'oh!





Ignore error bars for

very large for testing)

now...(purposefully set

2) <u>SIMC MM</u>

- Problem: Very long radiative tail (??) for SIMC MM distribution
- Solutions:
 - Dave checked over my input file and splash output. Incorrect decay length being used (π rather than K)
 - MM was not being recalculated by recon_hcana script

//M_recoil = sqrt(pow(nu+MD-Ep,2) - Pm*Pm); //recoil mass (neutron missing mass)
M_recoil = fB.M(); //recoil mass (neutron missing mass)

MMpi = sqrt(abs((pow(Em+(sqrt((MP*MP)+(pow((Pf_vec.Mag()), 2))))-(sqrt((mpi*mpi)+(pow((Pf_vec.Mag()), 2)))), 2)-(Pm*Pm)))); MMK = sqrt(abs((pow(Em+(sqrt((MP*MP)+(pow((Pf_vec.Mag()), 2))))-(sqrt((mk*mk)+(pow((Pf_vec.Mag()), 2)))), 2)-(Pm*Pm)))); MMp = sqrt(abs((Em*Em)-(Pm*Pm)));

// Pion missing mass
//missmass = MMpi;
// Kaon missing mass
missmass = MMK;
// Proton missing mass
//missmass = MMp;

MM2 = missmass * missmass;



2) MM PID Analvsis



Q²=2.115 Center Low eps



3) MM PID Analysis

- Problem: MM PID cut analysis
- Two MM regions analyzed
 - MM < 1.05
 - MM > 1.16





3) MM < 1.05

- Events clearly seen in SHMS aerogel below about 5 NPE. Perhaps an aero > 4.5 cut.
 - Such a cut will greatly help low eps but high still has significant leakage from protons
 - High eps will require pion leak subtraction



Q²=2.115

Low eps



3) MM < 1.05



Q²=2.115 High eps



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3) MM > 1.16

• That aero > 4.5 or so cut should also clean up this as well but still lots of leakage/higher channels



Q²=2.115

Low eps



3) MM > 1.16









4) MM cut: Yield Comparison

• Shockingly good agreement for both high and low eps



Low eps



High eps



4) MM cut: Ratio Comparison

• MM cut ratios are a bit better also



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Ignore error bars for now...(purposefully set very large for testing)

Q²=2.115





4) MM cut: Separated xsect Comparison



No MM cut



Ignore error bars for now...(purposefully set very large for testing)