Kaon LT Status Update

April 6th, 2022

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Analysis Phases

1. Calibrations ✔
   - Calorimeter, aerogel, HG cer, HMS cer, DC, Quartz plan of hodo
   - Assure we are replaying to optimize our physics settings
2. [~2 months] Efficiencies and offsets ⟵ Current step
   - Luminosity, elastics, Heeps, etc.
3. [3-4 months] First iteration of cross section ⟵ On-deck
   - Extract the kaon electroproduction cross section
4. [~1 months] Fine tune
   - Fine tune values to minimize systematics
5. [~3+ months] Repeat previous two steps
   - Repeat until acceptable cross sections are reached
   - This will highlight any potential complications
6. [~1 month] Possible attempt at form factor extraction
   - The Rosenbluth separation technique** is used to isolate the longitudinal term and thus the form factor can be extracted

2. Efficiencies and offsets

- 10.6 GeV -> Richard
- 8.2 GeV -> Ali
- 6.2 GeV -> Ali/Richard
- 3.8/4.9 GeV -> Vijay
- Goal: Finish these up by the summer time (more iterations will be needed in the future)

3. First iteration of cross section

- Goal: By the start of summer, start looking at Bill's code and getting cross-sections (even if previous step is not quite finished)

Yield Calculation

Total elastic events

$$\text{Yield} = \frac{N}{Q_{tot}\,\epsilon_{tot}}$$

$$cpuLT = \frac{EvtType}{\frac{TRIG_{accept}}{PS} - edtm}$$

$$track = \frac{\Sigma track_{nontrack}}{\Sigma track_{ntrack}}$$

$$Q_{tot} = (H.BCM.scaler.charge)$$

10.6 GeV

SHMS

θ_{SHMS}= 13.80

θ_{SHMS}= 16.25

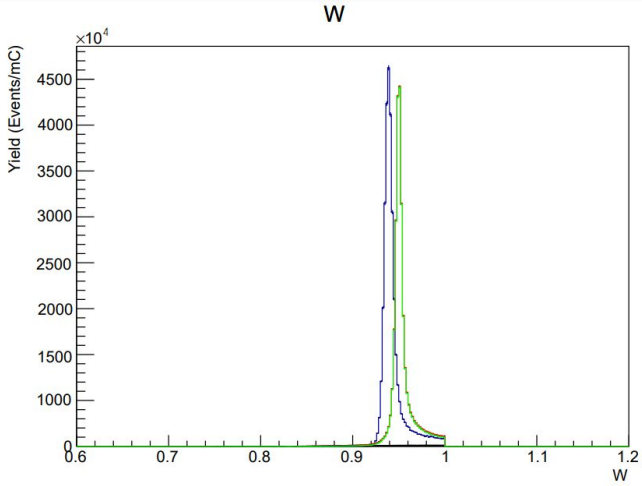
P_{HMS}= 24.15

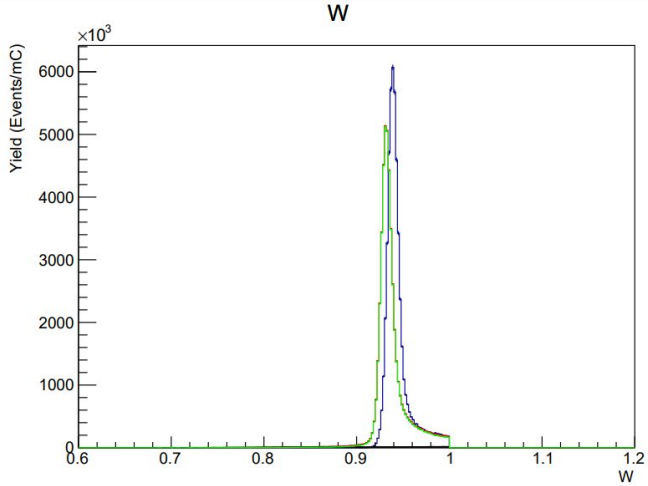
θ_{HMS}= -5.322

P_{SHMS}= -6.842

I = 70 uA

PS2=PS3=0





$$\text{Yield} = \frac{N}{Q_{tot}\epsilon_{tot}}$$

10.6 GeV

SHMS

θ_{SHMS}= 18.00

θ_{SHMS}= 19.85

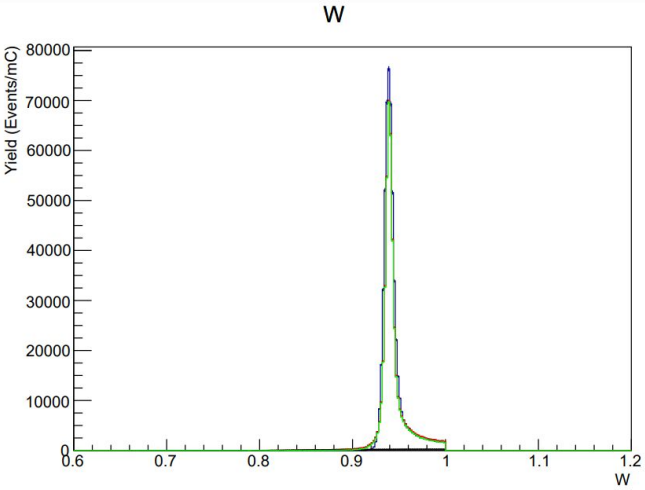
P_{HMS}= 24.15

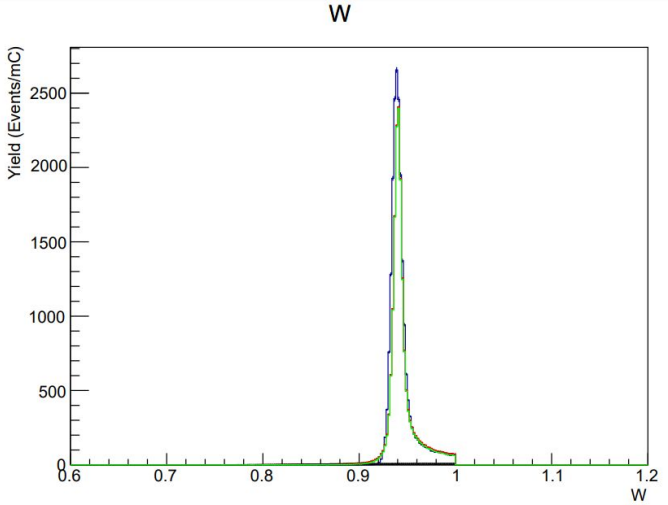
θ_{HMS}= -5.322

P_{SHMS}= -6.842

I = 70 uA

PS2=PS3=0





$$\text{Yield} = \frac{N}{Q_{tot}\epsilon_{tot}}$$

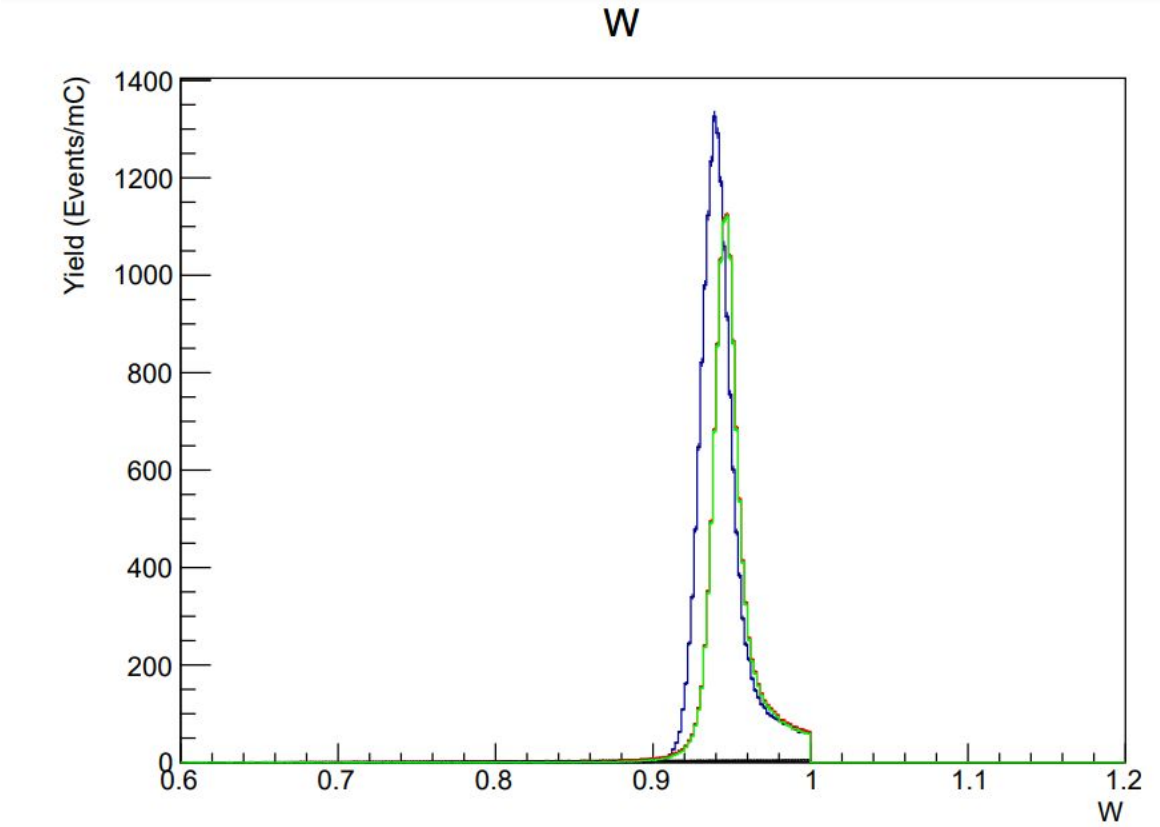
SHMS

10.6 GeV

θ_{SHMS}= 20.00

P_{HMS}= 22.60
θ_{HMS}= -5.322
P_{SHMS}= -6.311
I = 70 uA
PS2=PS3=0

$$\text{Yield} = \frac{N}{Q_{tot}\epsilon_{tot}}$$



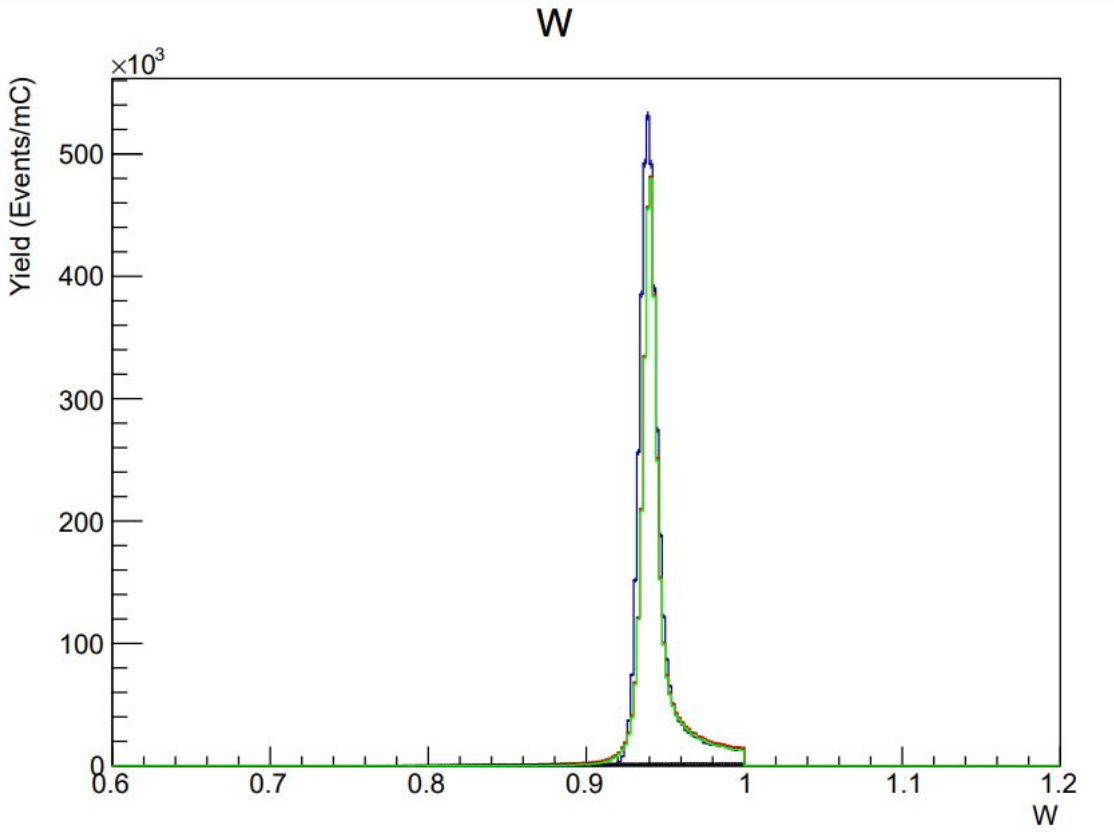
SHMS

10.6 GeV

θ_{SHMS}= 13.70

P_{HMS}= 18.80
θ_{HMS}= -6.590
P_{SHMS}= -8.035
I = 70 uA
PS2=PS3=0

$$\text{Yield} = \frac{N}{Q_{tot}\epsilon_{tot}}$$



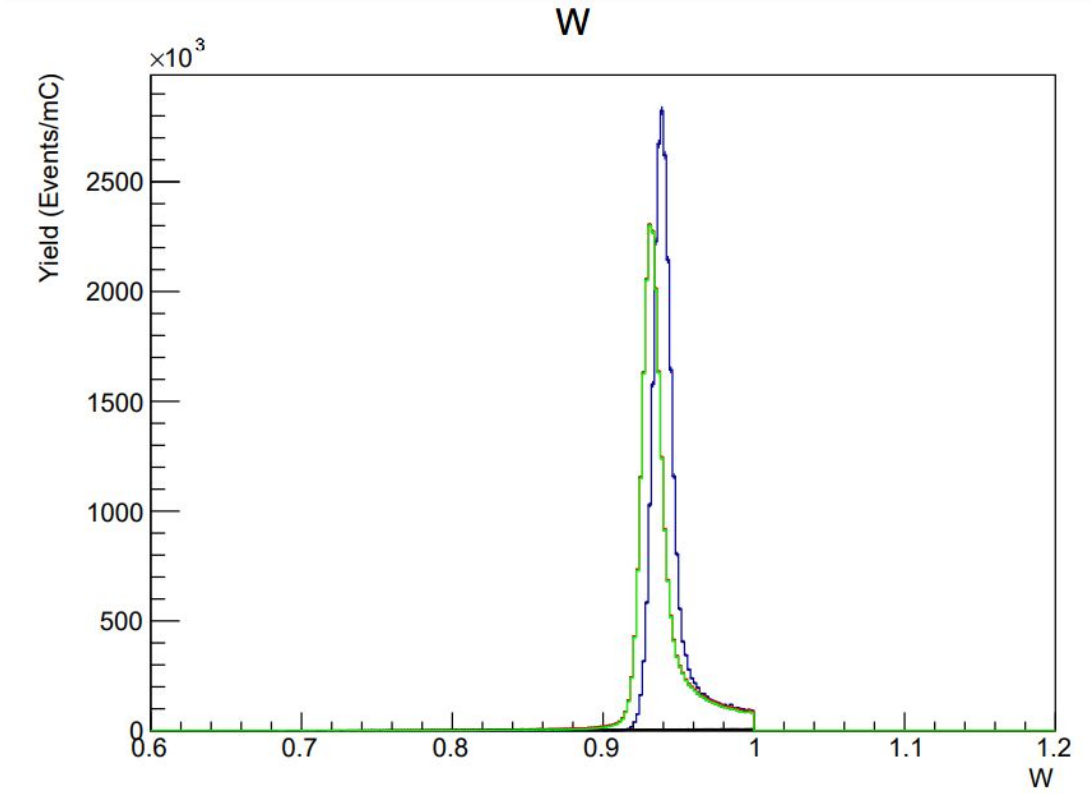
SHMS

10.6 GeV

θ_{SHMS}= 11.70

P_{HMS}= 17.20
θ_{HMS}= -6.590
P_{SHMS}= -8.035
I = 70 uA
PS2=PS3=0

$$\text{Yield} = \frac{N}{Q_{tot}\epsilon_{tot}}$$



SHMS

10.6 GeV

θ_{SHMS}= 15.65

P_{HMS}= 19.75
θ_{HMS}= -6.590
P_{SHMS}= -8.035
I = 70 uA
PS2=PS3=0

$$\text{Yield} = \frac{N}{Q_{tot}\epsilon_{tot}}$$