Structure in 2020 Data

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Update

- In an attempt to understand an extra wide resonance in the energy-dependent yield extractions for the $\Xi(1530)$ in the Spring ’18 data, I started using different datasets.

- Looking at invariant mass plots in 2020 data, I found a feature that could be the explanation for the additional width.

Decay Chain

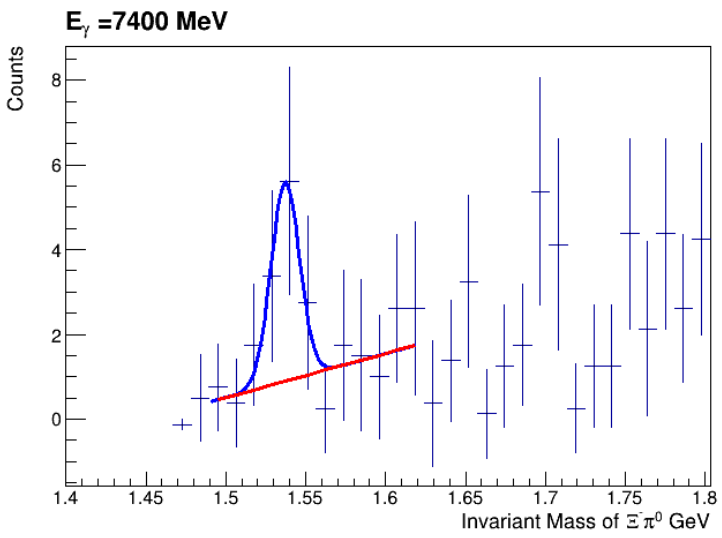
$$\gamma p \rightarrow K^+ Y^*$$
$$Y^* \rightarrow K^+ \bar{\Xi}^{-*}$$
$$\bar{\Xi}^{-*} \rightarrow \bar{\Xi}^- \pi^0$$
$$\bar{\Xi}^- \rightarrow \Lambda \pi^-$$
$$\Lambda \rightarrow p \pi^-$$

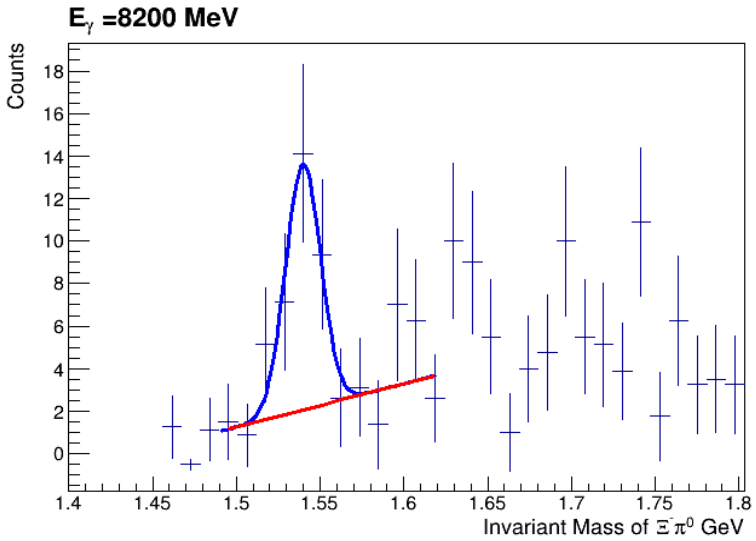
- The masses of Λ and pions are constrained to the known masses in the kinematic fit.

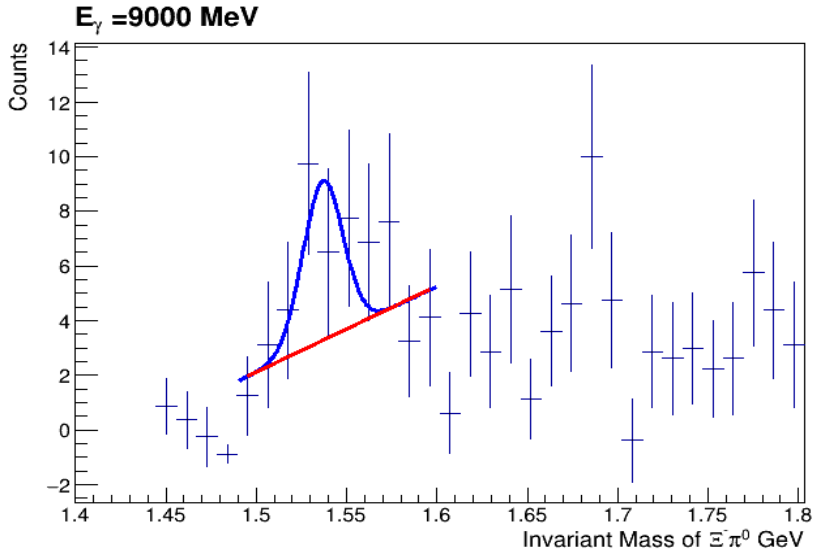
Analysis Cuts

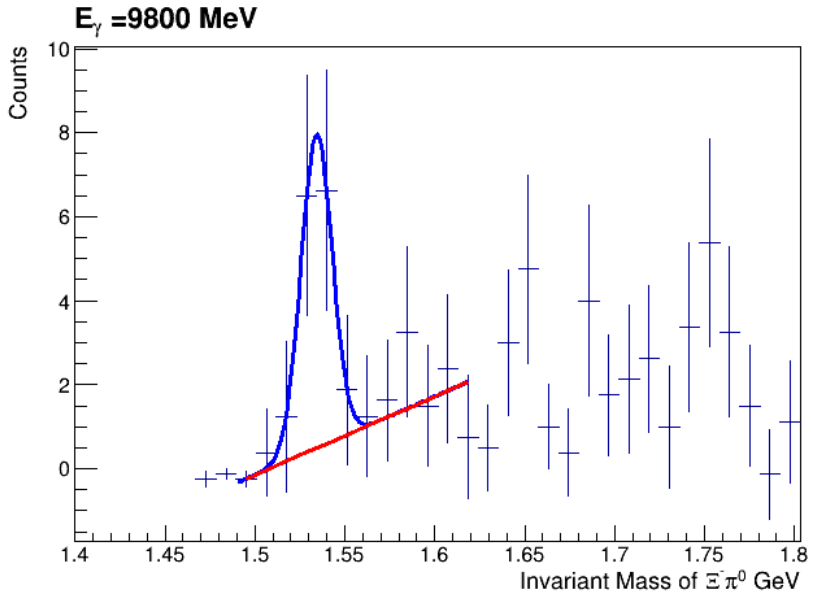
- CL > 10-4
- Invariant Mass Cut on the reconstructed Ξ^-, $1.31 > \Lambda\pi^- < 1.34$ GeV
- Remove K^*background contribution

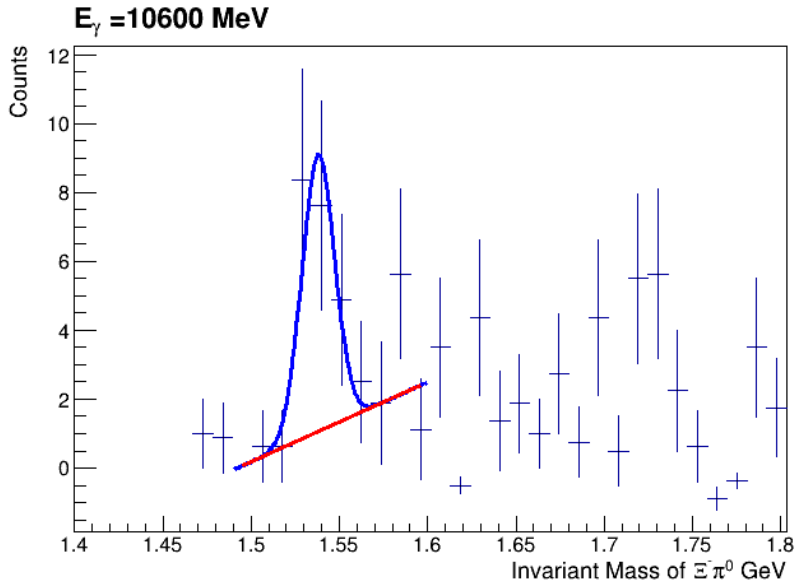
Energy-dependent $\Xi(1530)$ Yield Extraction, ~1/2 GlueX Phase I Data











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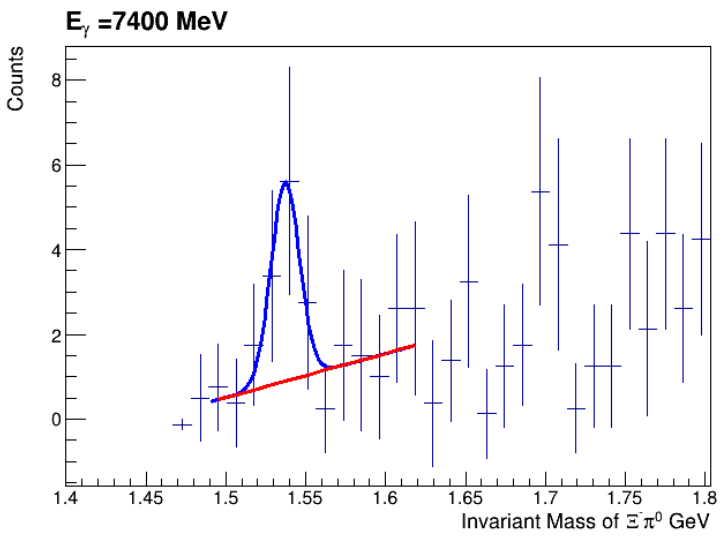
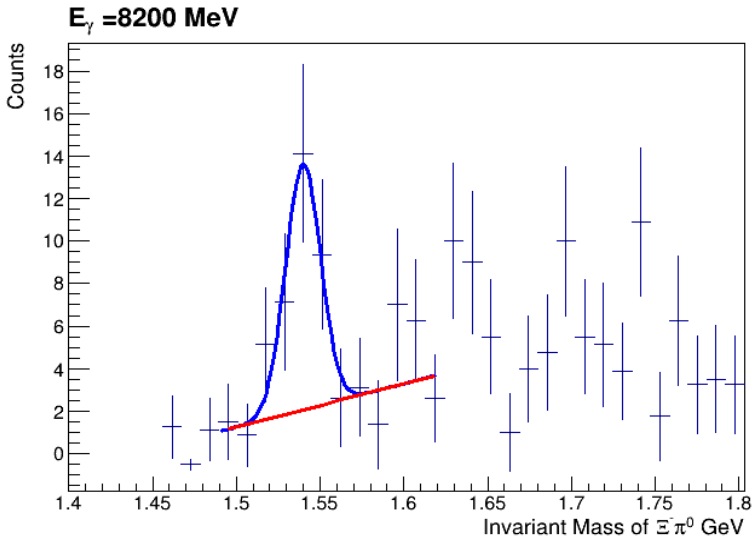
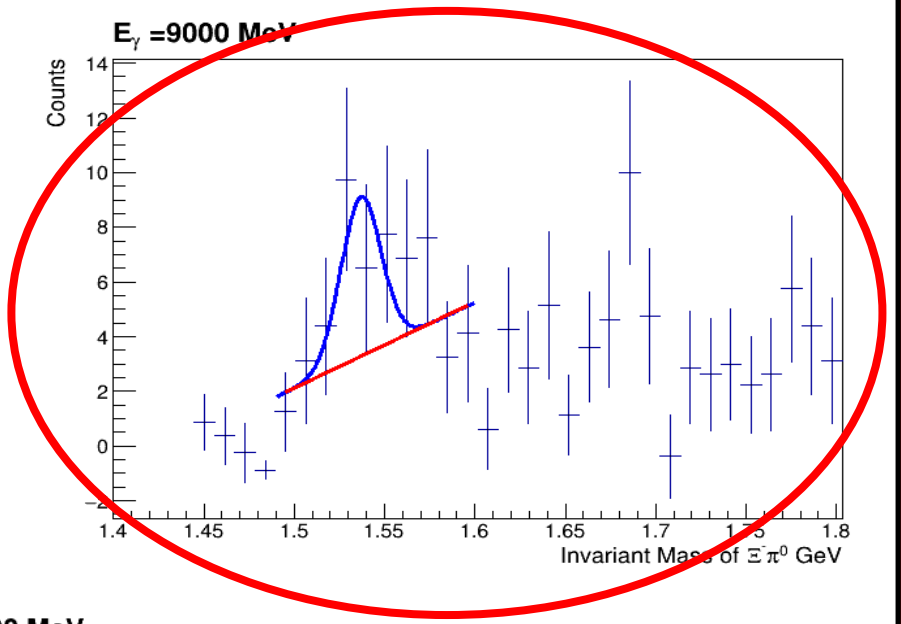
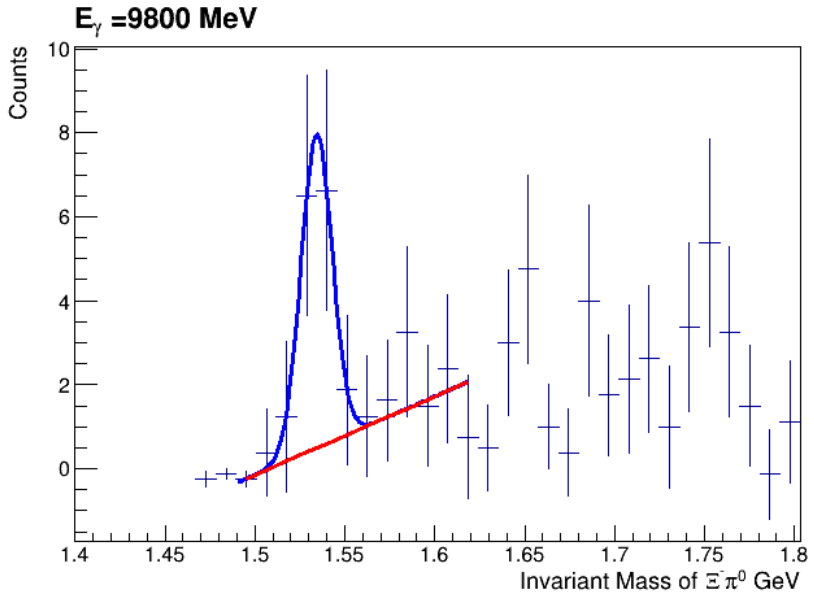
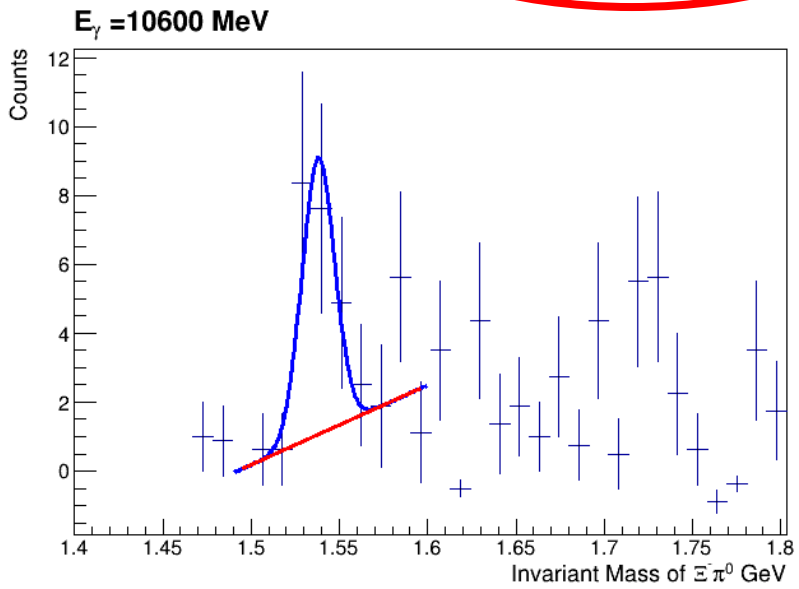




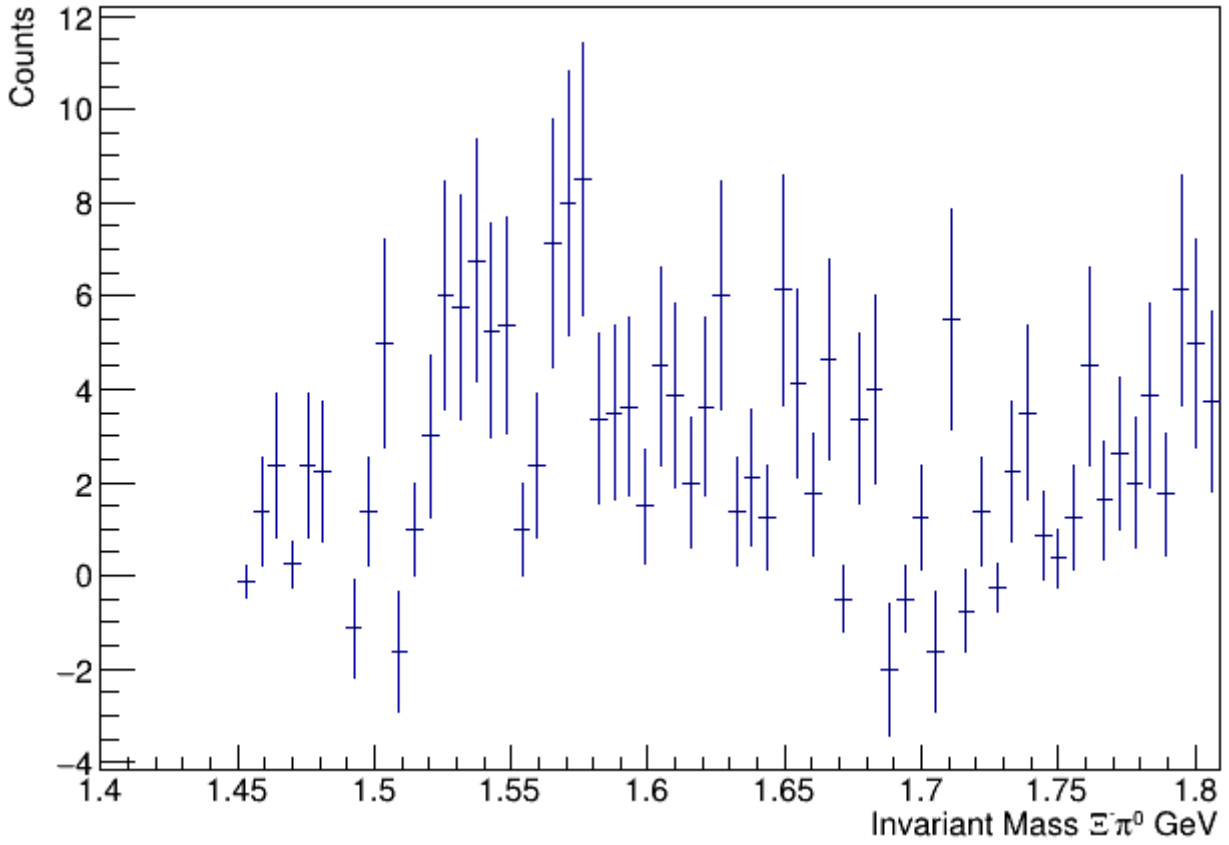






2020 Data: Rconstructed $\Xi(1530)$ 8.6<E_γ<9.4

Emphasize the range 1.5-1.6



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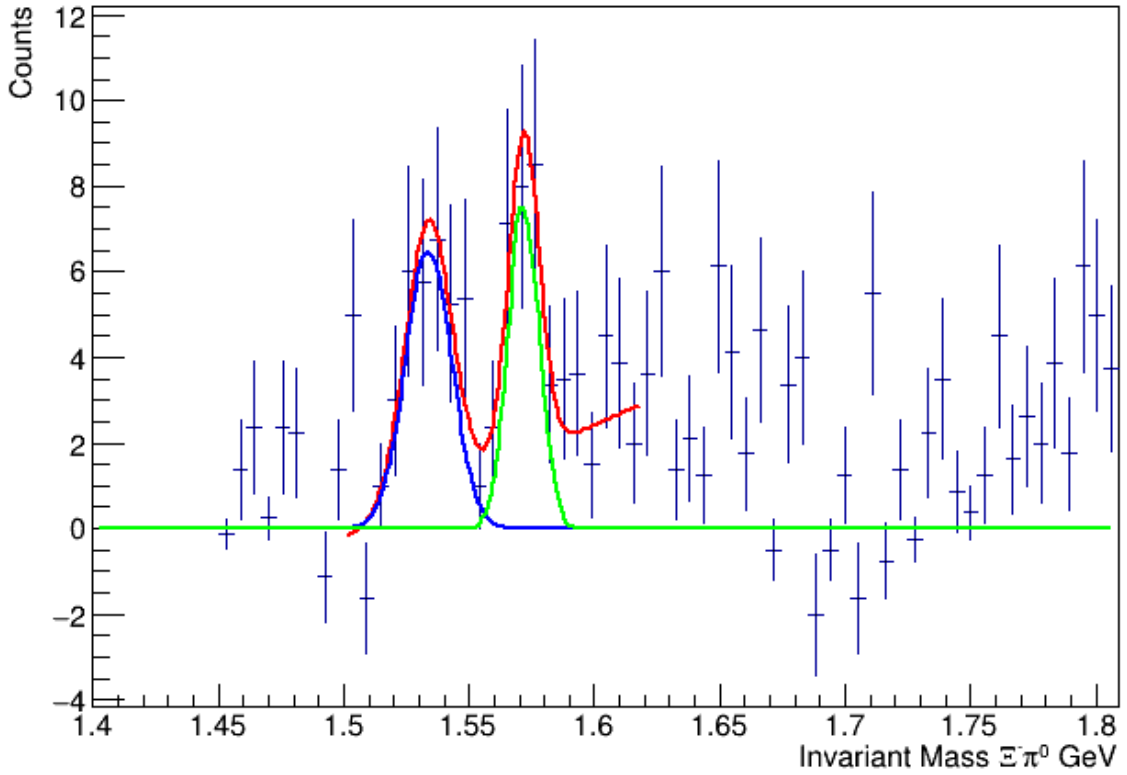
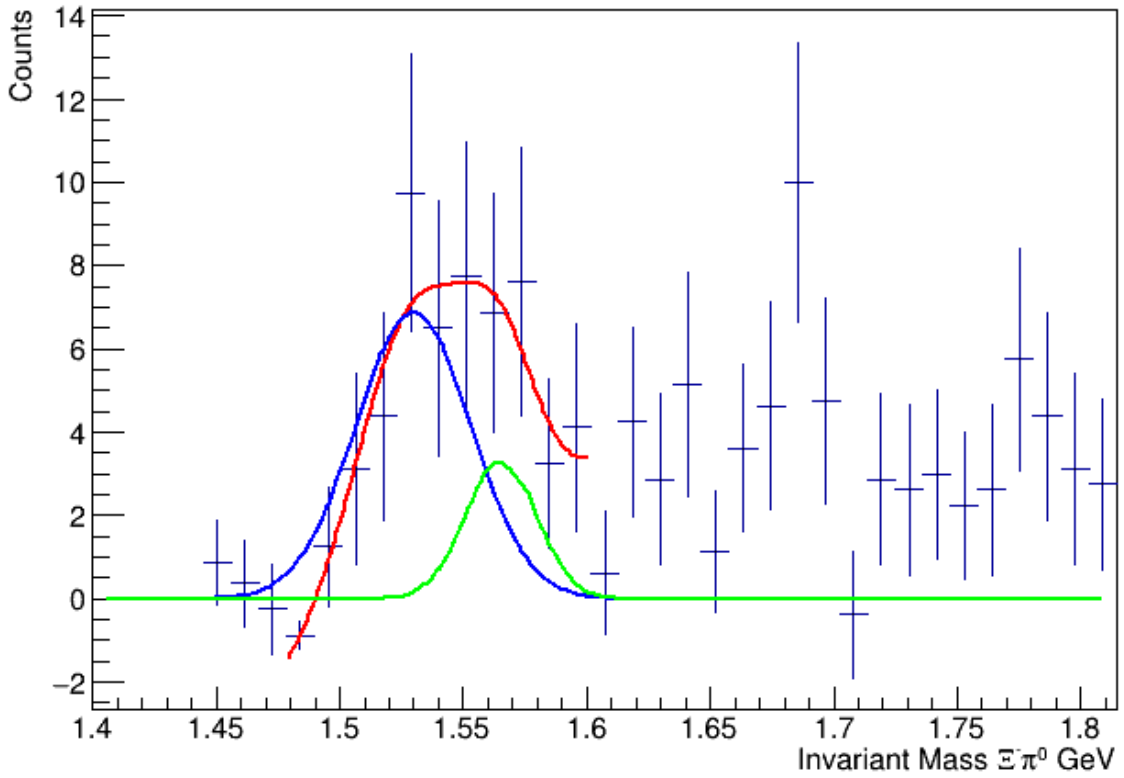


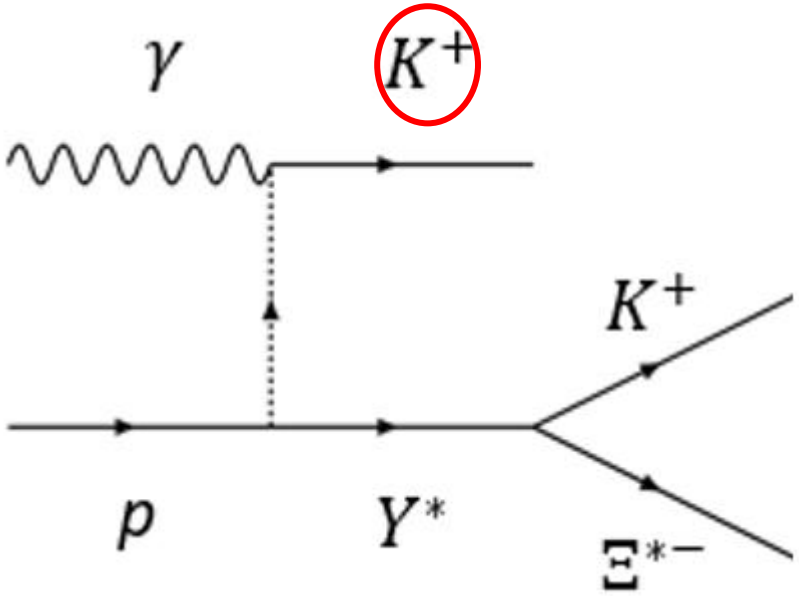
- Centers:
  - $\Xi(1530)$ →1.533(2)
  - Feature →1.572(2)
- FWHM:
  - $\Xi(1530)$ →22(5)
  - Feature →14(4)

Revisiting Sp 18 Data

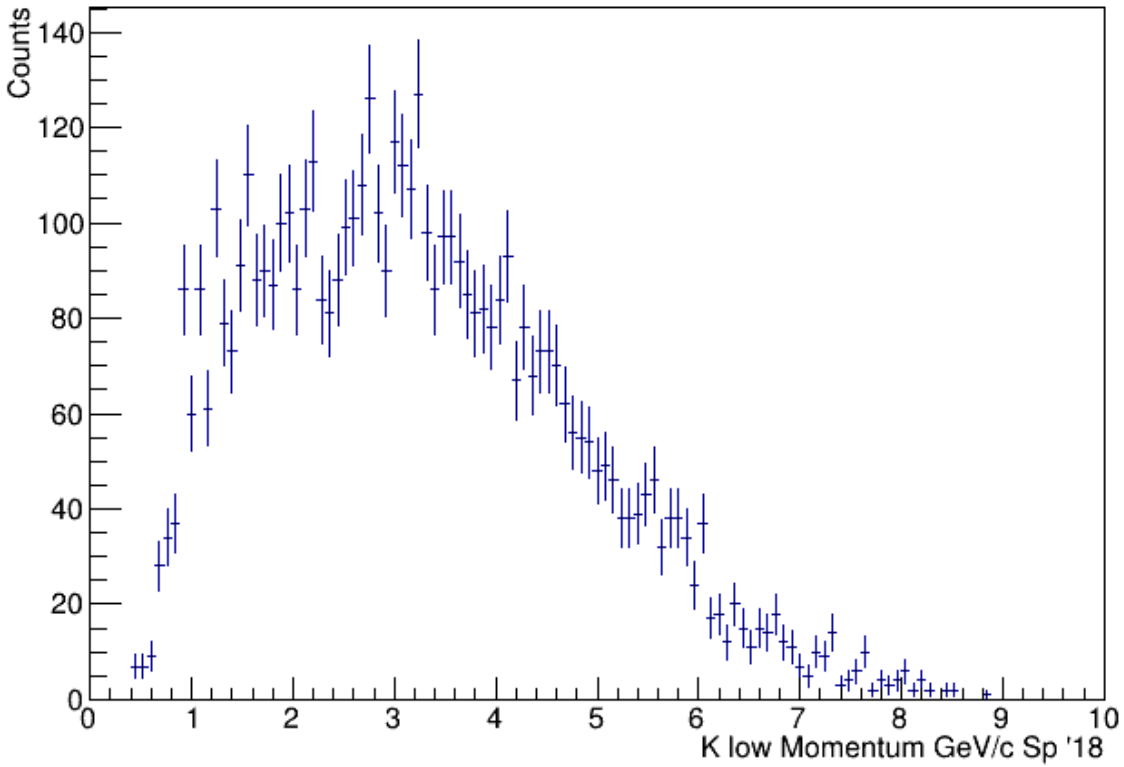


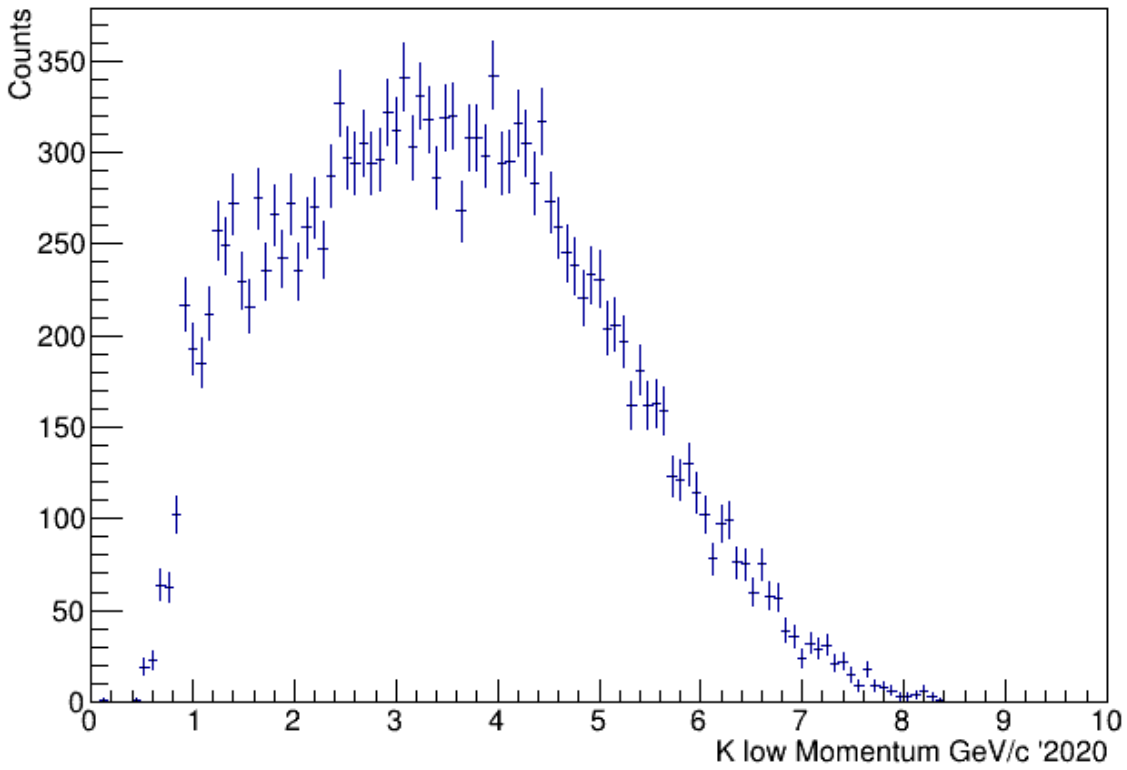
- Centers:
  - Ξ(1530) →1.53(2)
  - Feature →1.57(2)
- FWHM:
  - Ξ(1530) →54(52)
  - Feature →34(4)

Pion Contamination



Low Kaon Momentum





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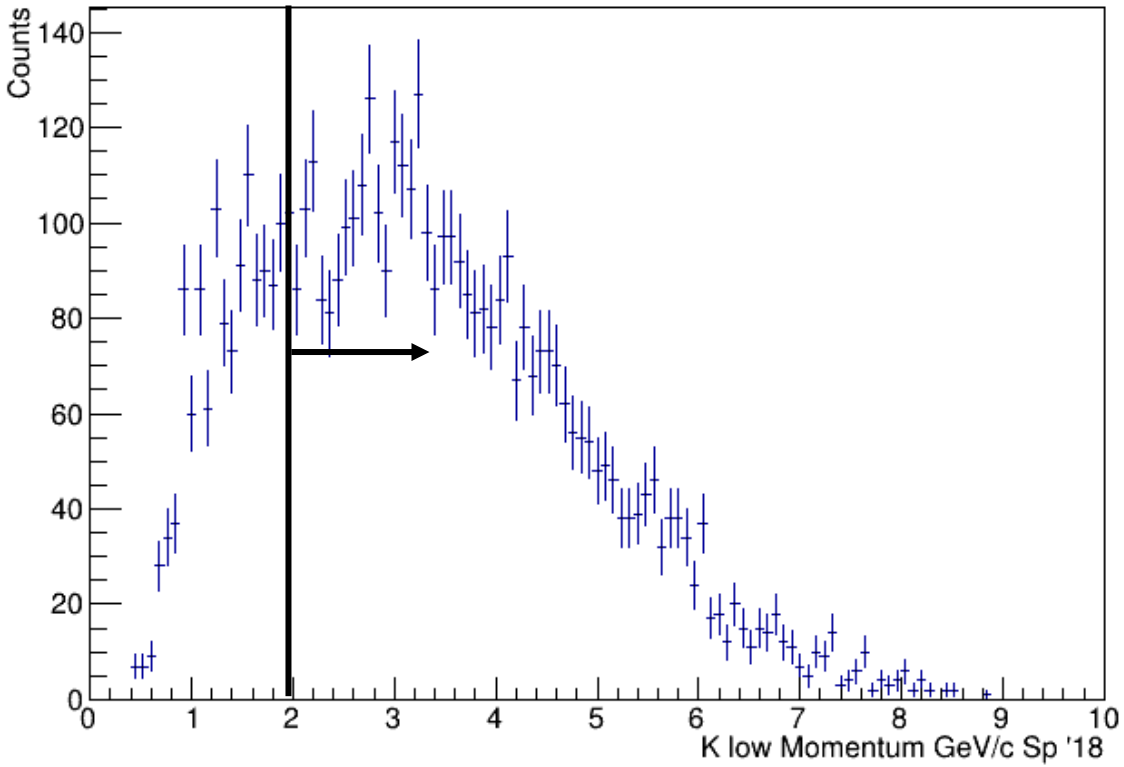
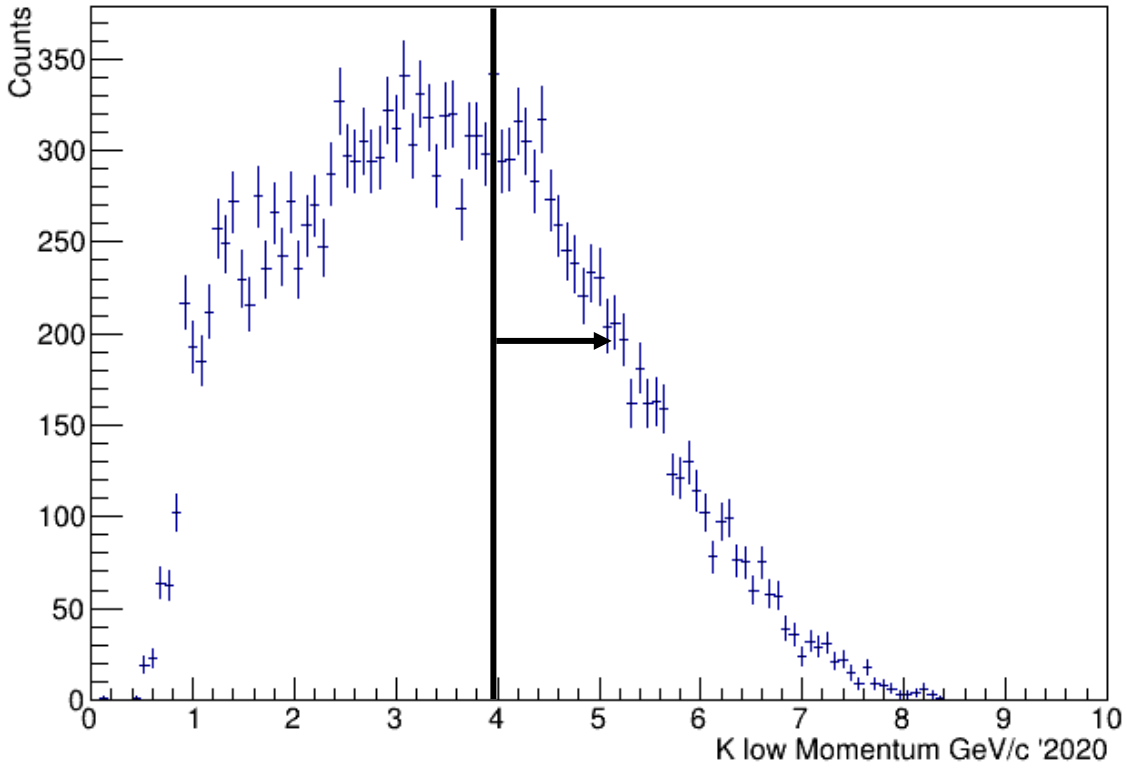
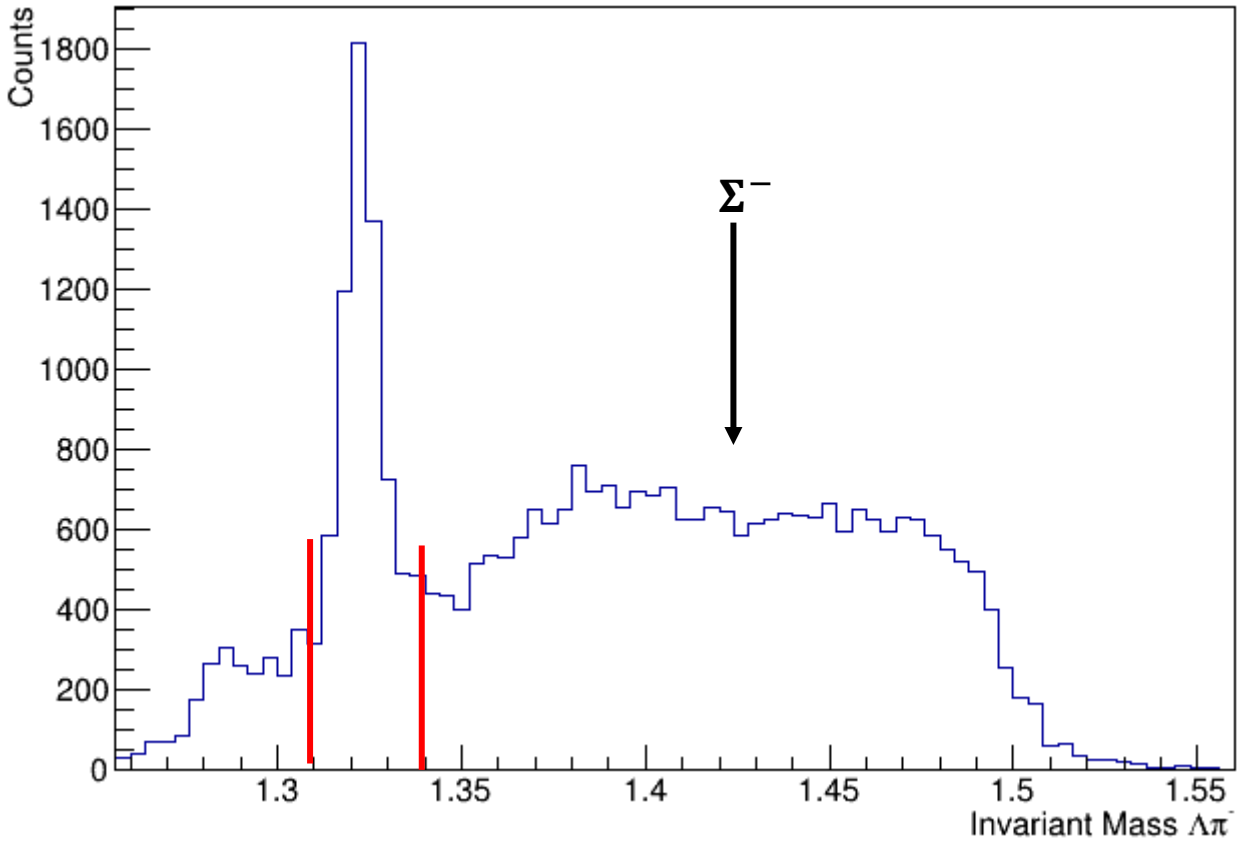




Invariant Mass Cut on $\Xi(1320)$



Future Plans

- Two dimensional plot of Ξ(1320) vs Ξ(1530), to extract yields bin by bin

- Compare Σ^- backgrounds between sp ‘18 and 2020 runs