Kπ-production using LASS parametrization

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Kπ–Production

- Use Kπ-production of LASS (Nuclear Physics B133 (1978) 490-524) to study the Kπ final state in the reaction KL p → KS π n w/ assuming that the cross-section is similar to the cross-section of the charged kaon reaction K p → K π n.
- The t-dependent parametrization of the naturality amplitude L_λ^{+-} for the production of a Kπ state of invariant mass $m_{K\pi}$, center-of-mass momentum q, angular momentum L, and t-channel helicity λ, by natural (+) and unnatural (-) parity exchange:

$$L_0 = \frac{\sqrt{-t}}{m_\pi^2 - t} G^L_{K\pi}(m_{K\pi}, t), \quad L_1^- = \sqrt{\frac{1}{2}L(L+1)}\, G^L_{K\pi}(m_{K\pi}, t)\, \gamma_c(m_{K\pi}) \exp\left(b_c(m_{K\pi})(t - m_\pi^2)\right)$$

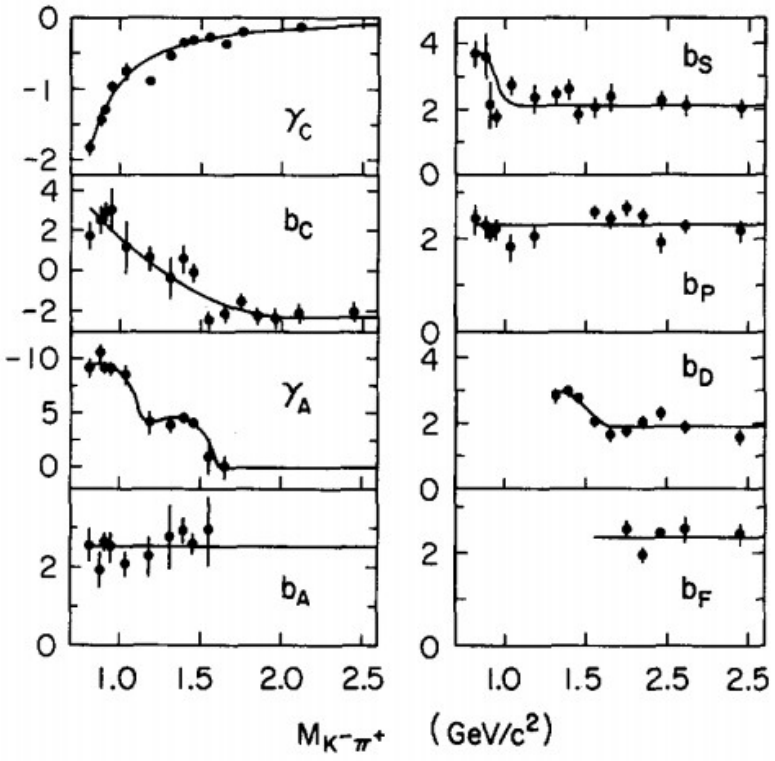
$$L_1^+ = \sqrt{\frac{1}{2}L(L+1)}\, G^L_{K\pi}(m_{K\pi}, t)\left[\gamma_c(m_{K\pi}) \exp\left(b_c(m_{K\pi})(t - m_\pi^2)\right) - 2i\,\gamma_a(m_{K\pi}) \exp\left(b_a(m_{K\pi})|t'|(t - m_\pi^2)\right)\right]$$

$$L_\lambda^{+-} = 0, \quad \lambda \geq 2 \ .$$

$$G^L_{K\pi}(m_{K\pi}, t) = N \frac{m_{K\pi}}{\sqrt{q}} a_L(m_{K\pi}) \exp\left(b_L(m_{K\pi})(t - m_\pi^2)\right), \quad a_L^I = \sqrt{(2L+1)}\, \epsilon^I \sin\delta_L^I\, e^{\delta_L^I}$$

Kπ–Production

- The parameters $\gamma_c, b_c, \gamma_a, b_a, b_L$ are mass-dependent and are determined by fitting the data in each mass interval.
- Assumed constant in the following simulation. To be parametrized in the next update.



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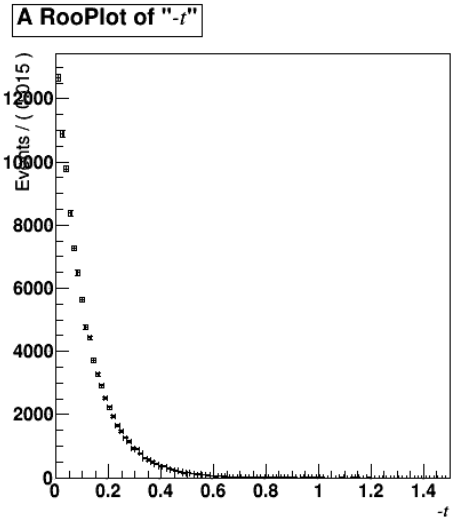
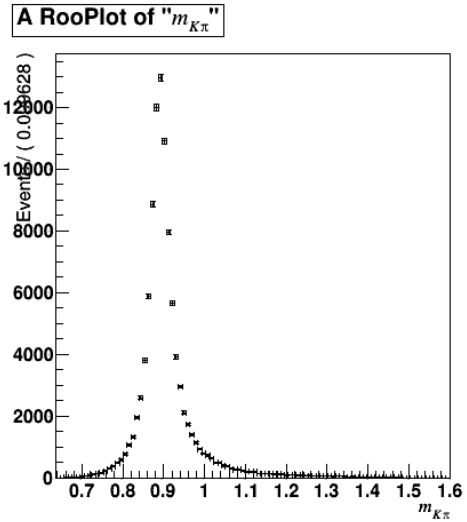
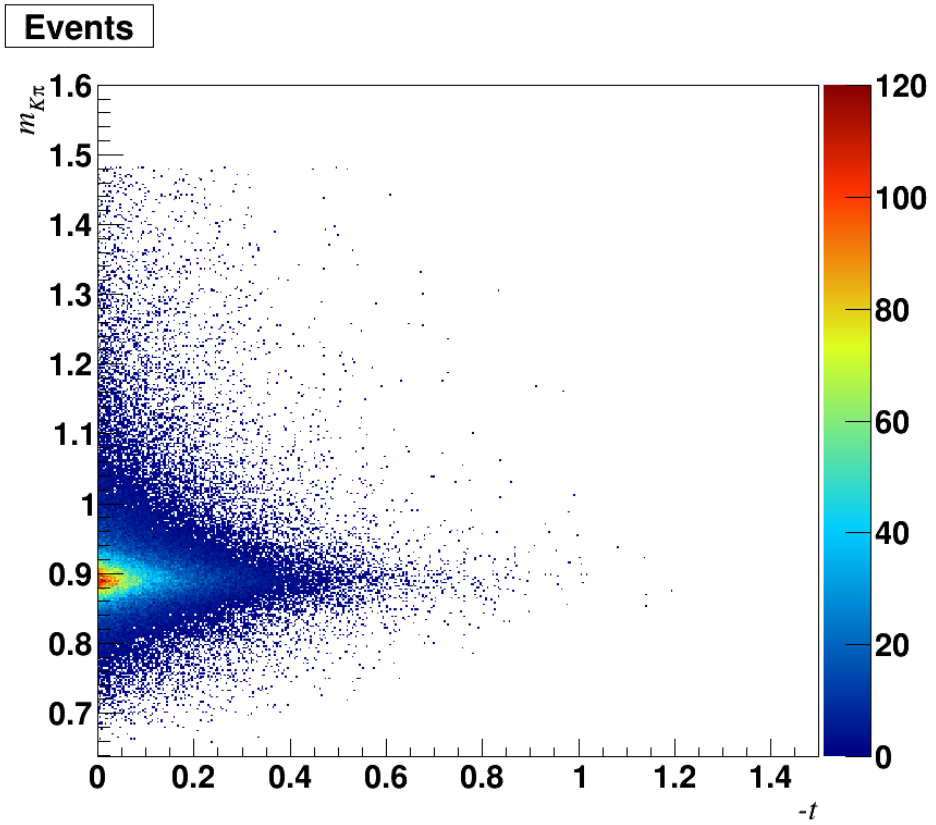
- Monte-Carlo simulation of $K^*(892)$ using LASS model (100 kevents):

e.g. E_{beam} = 7 GeV







Rapid variation of -t → thin bins on -t to study the phase motion.

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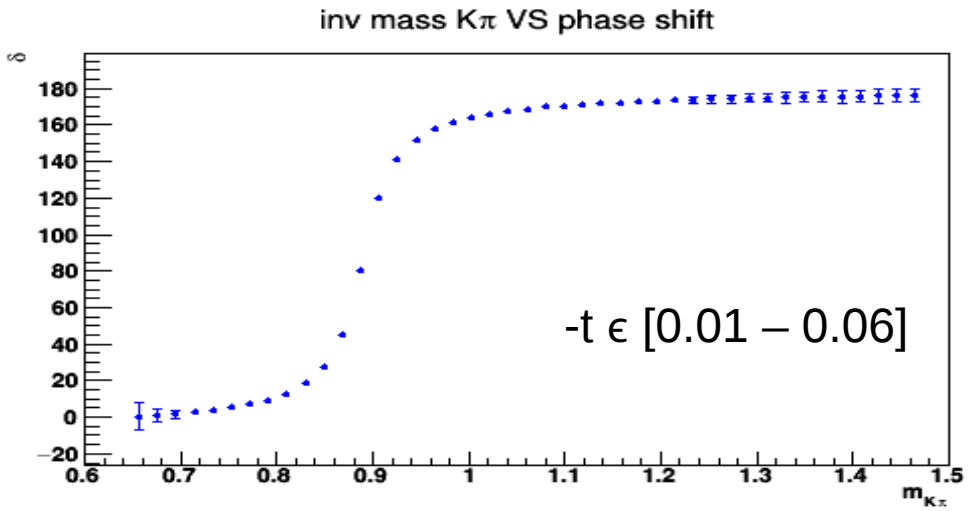

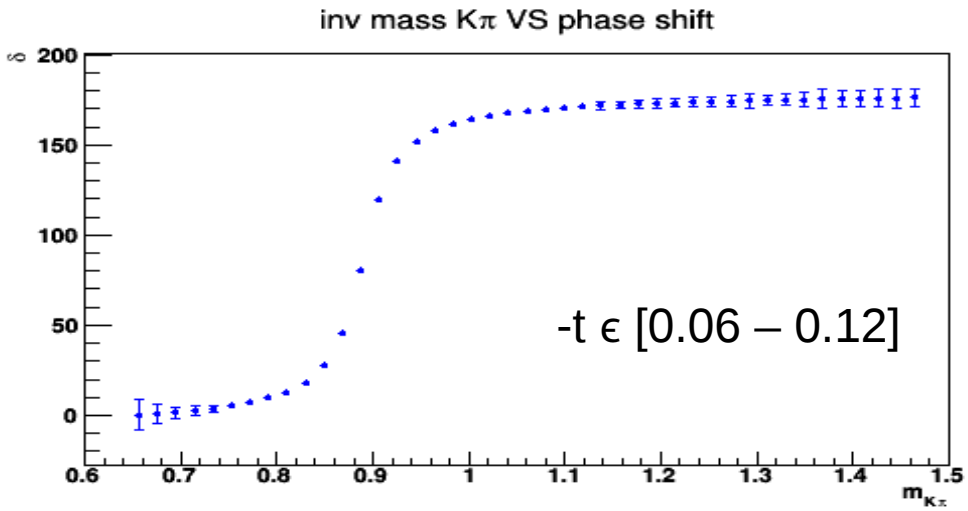

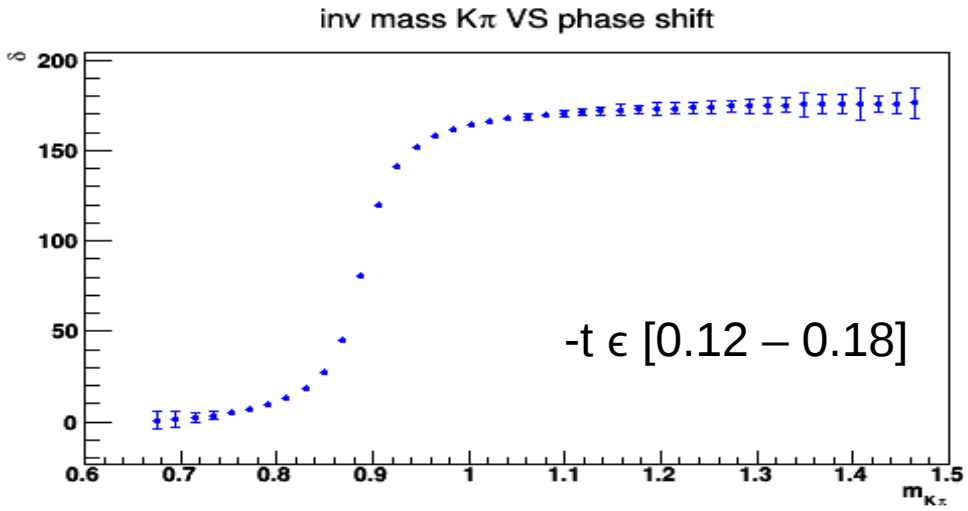

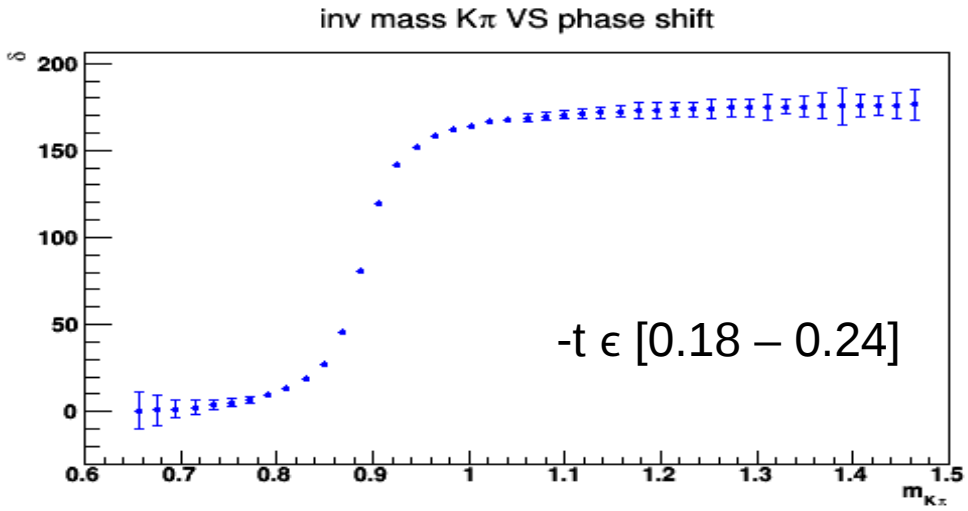

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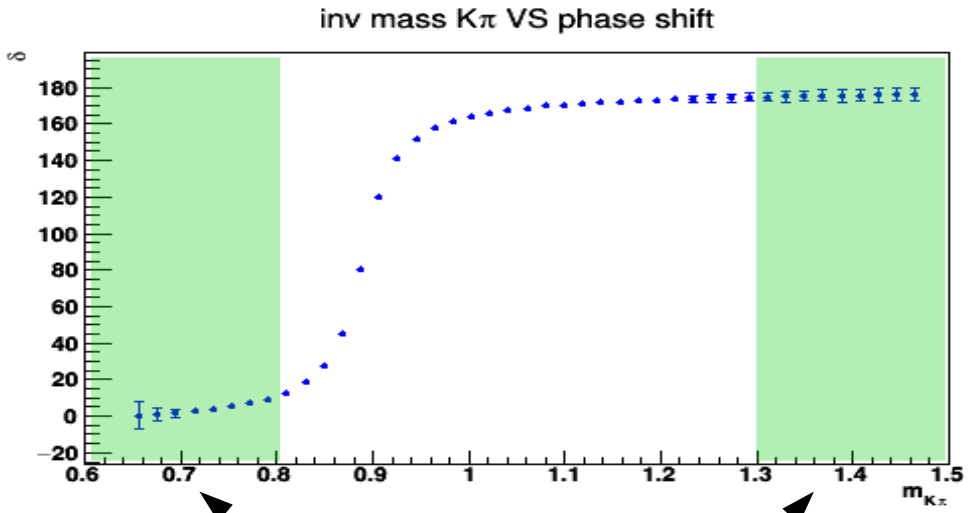

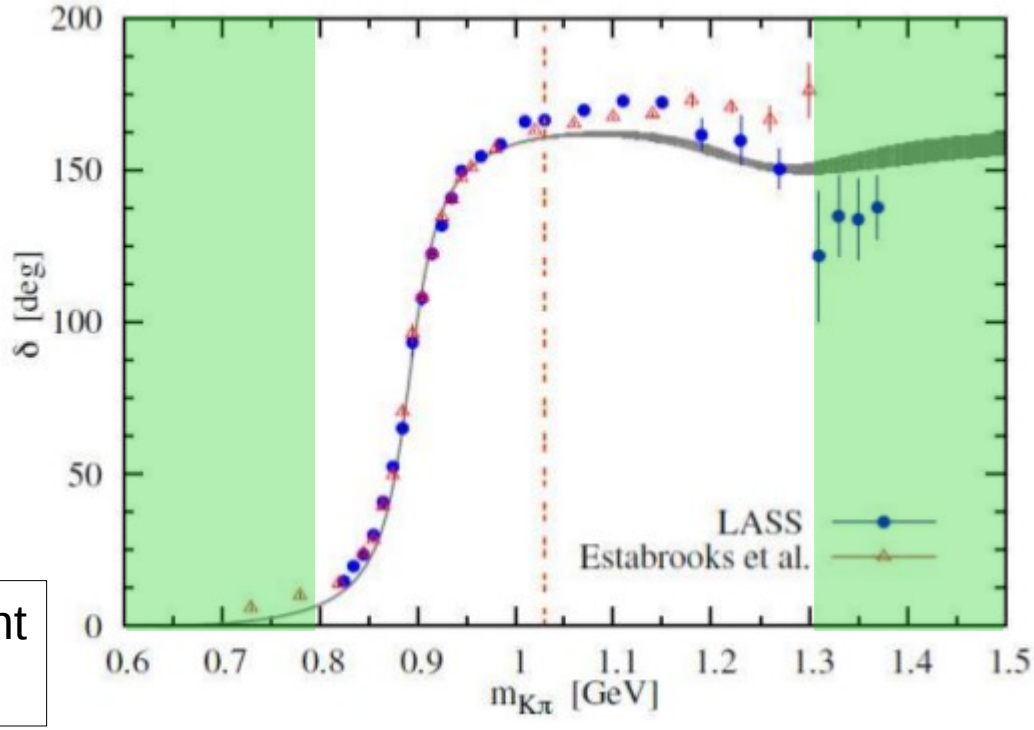

Ranges of $m_{K\pi}$ that require an improvement in term of statistics.

Kπ–Production

- Ongoing:
  - The estimation of the event number within 100 days of production.
  - Simulate the events in GlueX.
  - The same simulation including the S-waves.

Thank You!