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:

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

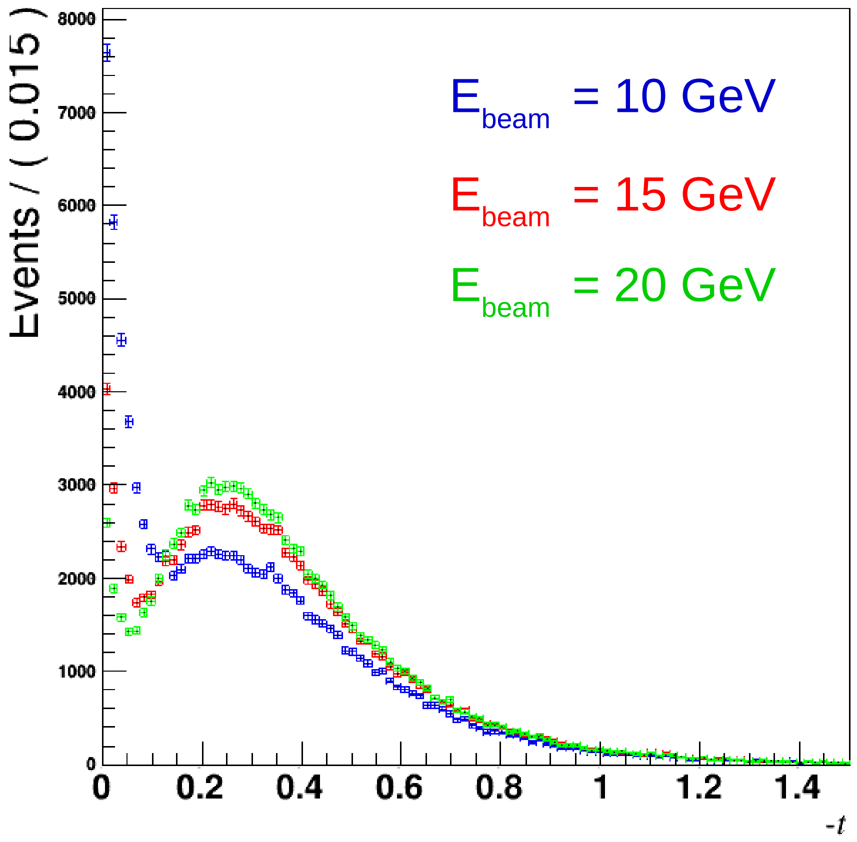
$$L_1^+ = \sqrt{\frac{1}{2} L(L+1)} G_{K\pi}^L(m_{K\pi}, t) [\gamma_c(m_{K\pi}) \exp(b_c(m_{K\pi})(t - m_\pi^2)) - 2i\gamma_a(m_{K\pi}) \exp(b_a(m_{K\pi}) |t'| (t - m_\pi^2))]$$

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

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

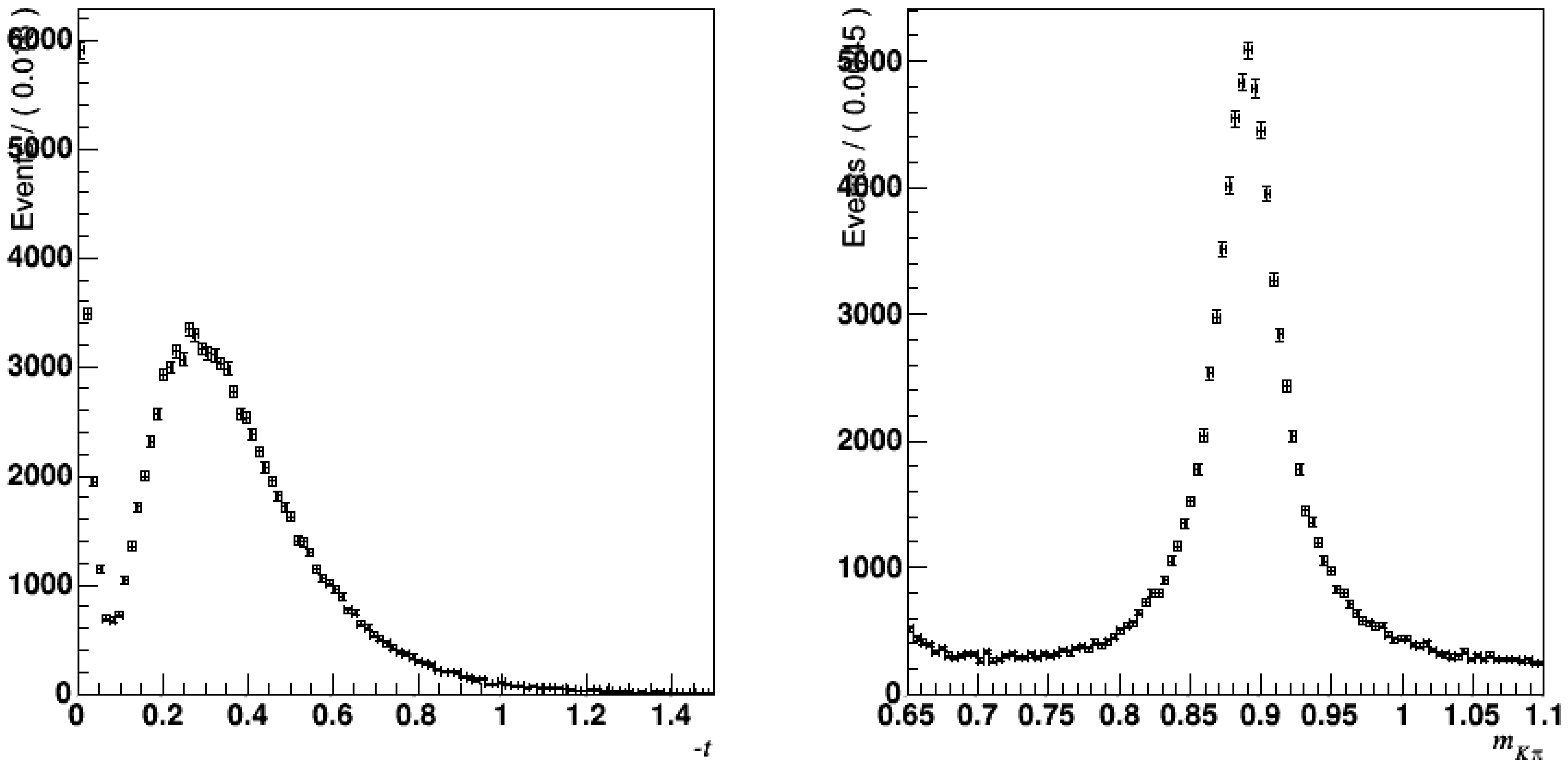
$K\pi$–Production

- Generator Update: RooGenKpi(-t, m_{kpi}) → RooGenKpi(-t, m_{kpi}, E_{beam})
- $t' = t - t_0$, $t_0 = f(s, m_i, p_i)$, $s = f(E_{beam}, m_i)$.



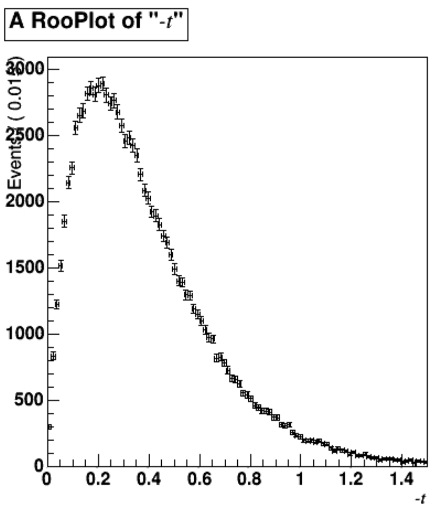
Kπ–Production

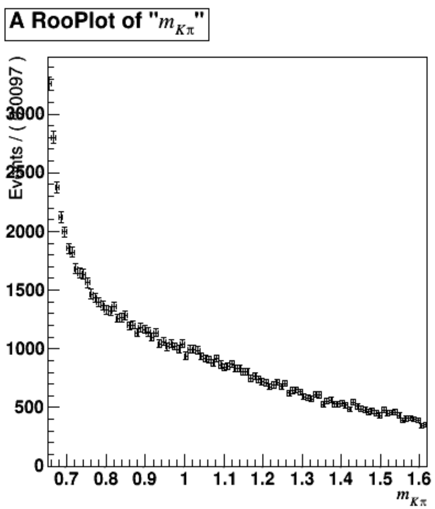
- Including K*(800):
  - Mass and width from the PDG: m = 0.682 GeV,   Γ = 0.547 GeV

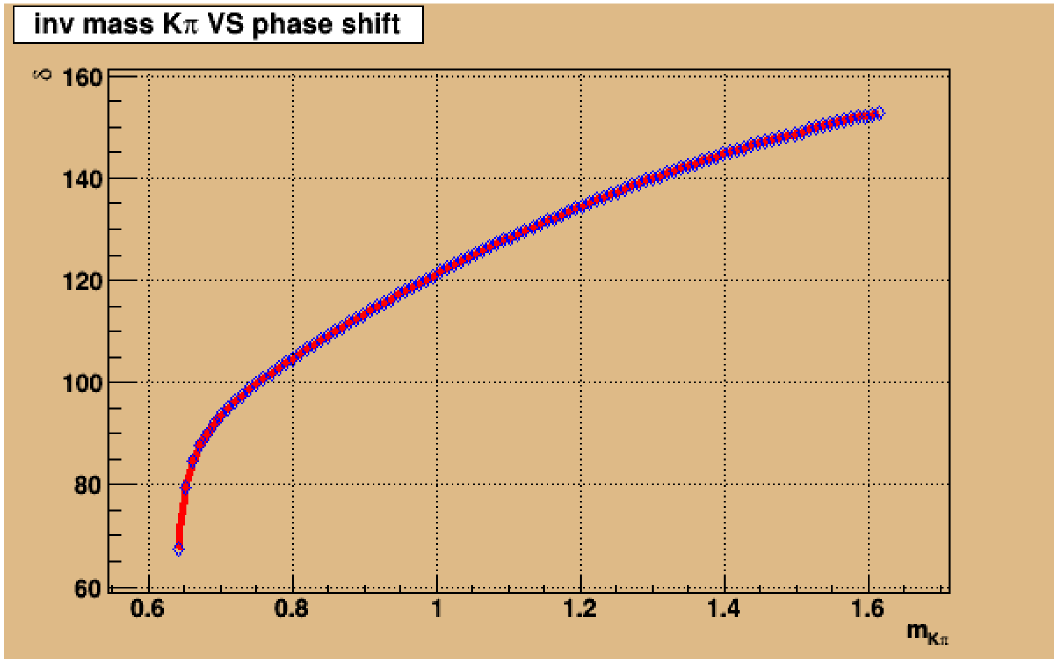


Kπ–Production

- Phase-shift: only the S-wave K*(800)

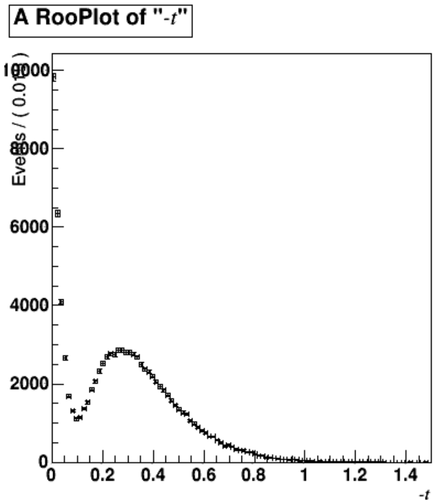


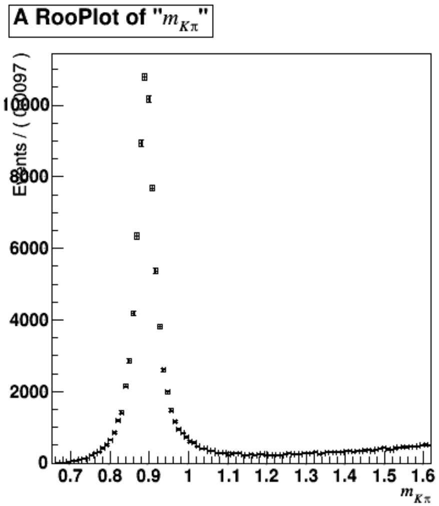


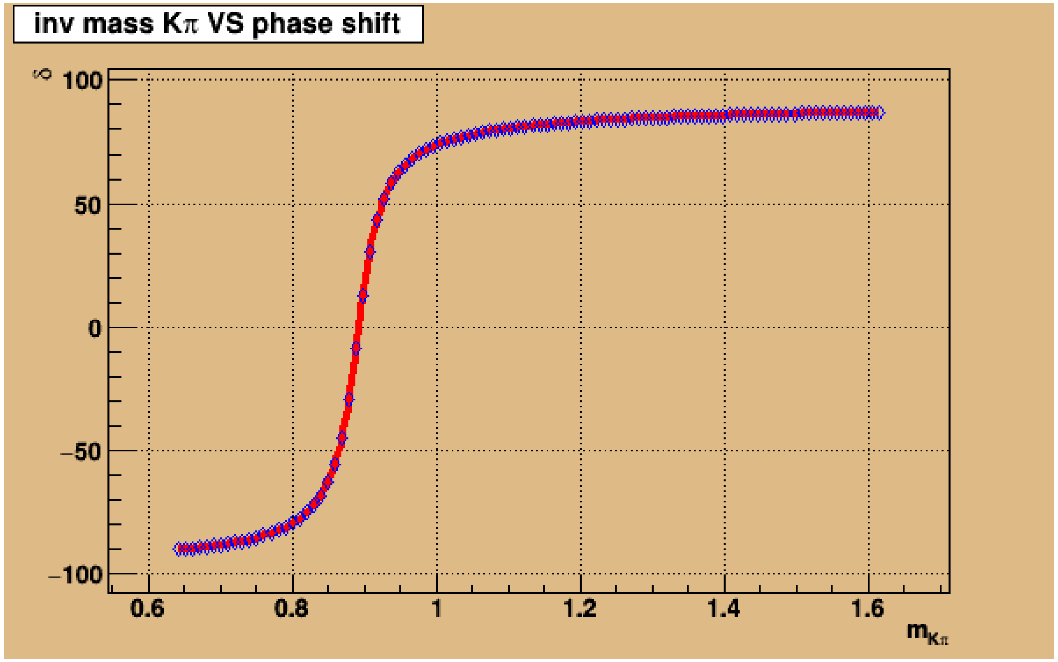


Kπ–Production

- Phase-shift: only the P-wave K*(892)

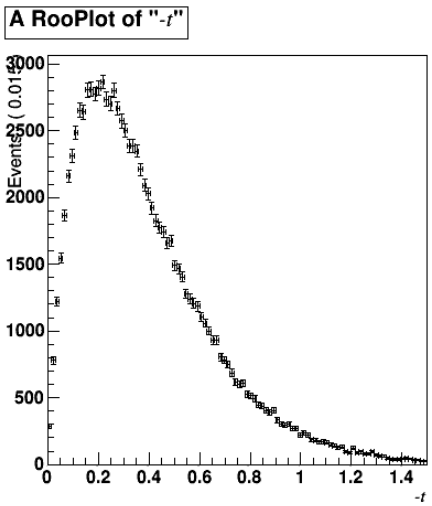


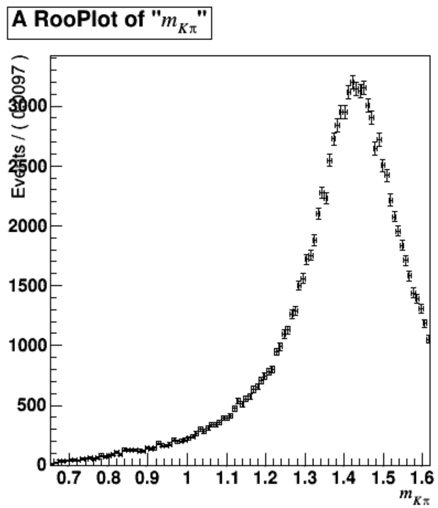


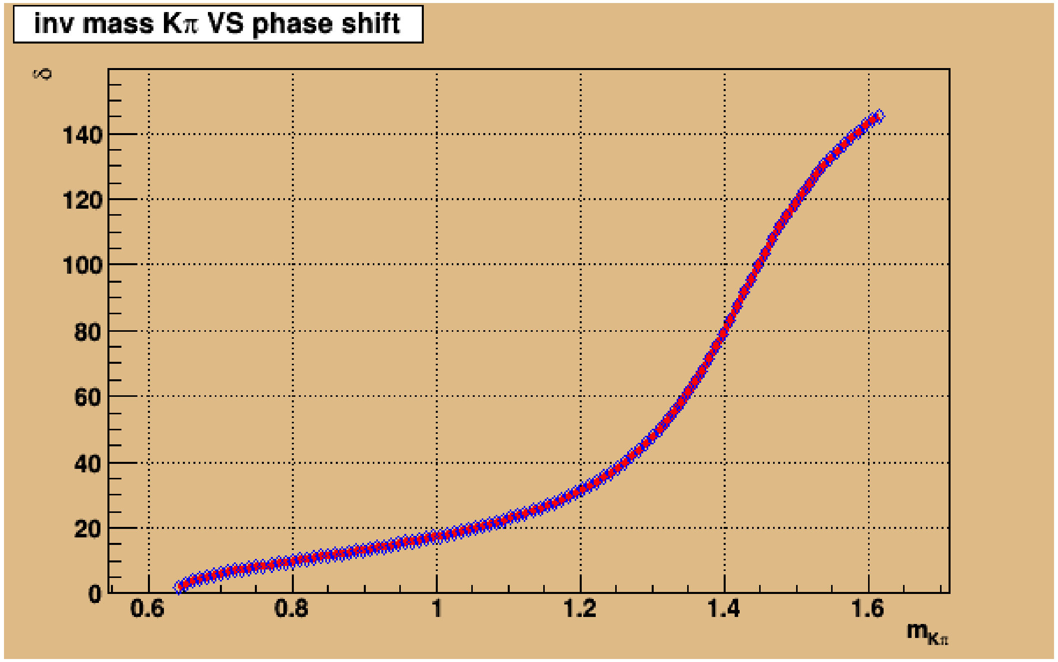


Kπ–Production

- Phase-shift: only the S-wave $K^*_0(1430)$







Thank You!