K^{*0} production in Pb + Pb collision at 2.76 TeV

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Features of neutral K* meson:

Mass : 895.94 ± 0.22 MeV
Width : 48.7 ± 0.8 MeV
Decay Modes : $K\pi$ ~ 100 %
Decay Modes for present study
$K^+ + \pi^-$
$K^- + \pi^+$
BR ~ 66%

Life time : ~ 4 fm
Quark Structure : Particle d sbar
anti-particle dbar s

Motivation

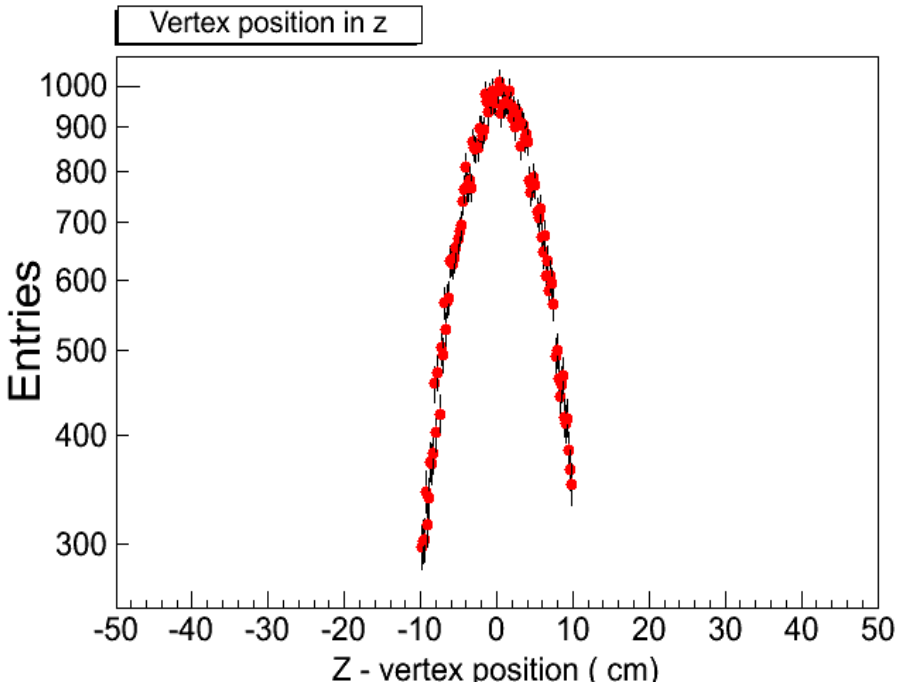
- K* life time ≈ 4 fm/c, comparable to the life time of the fireball
  Sensitive to the properties of the hot dense matter

- K* Mass and Width: in - medium dynamical effects

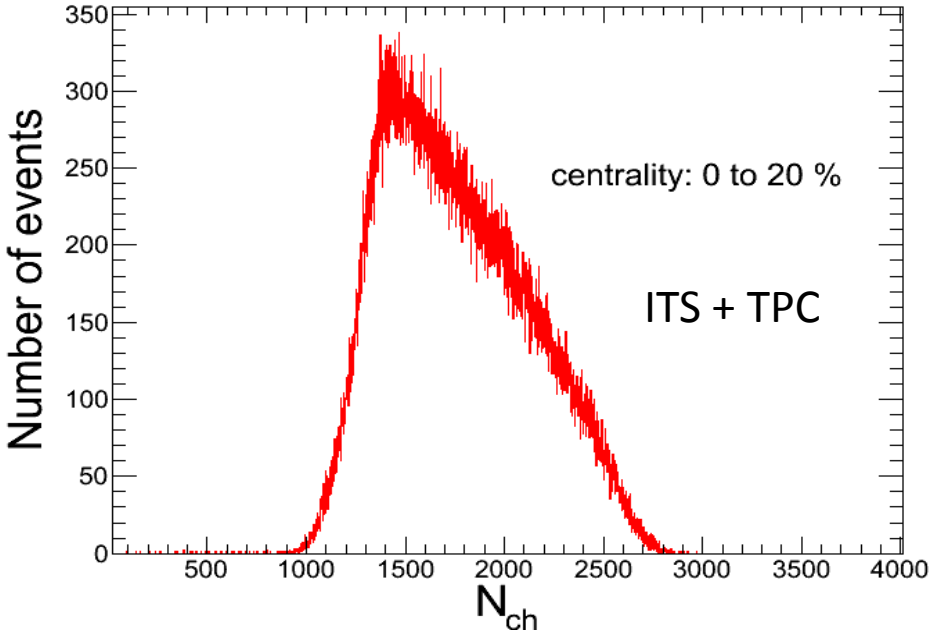
Event Selection

Data set used: LHC10h Pb + Pb 2.76 TeV

Vertex selection: |vZ| < 10 cm



Centrality selection:



Centrality: 0 to 20 %

Number of events analyzed: 274345

Track Selection

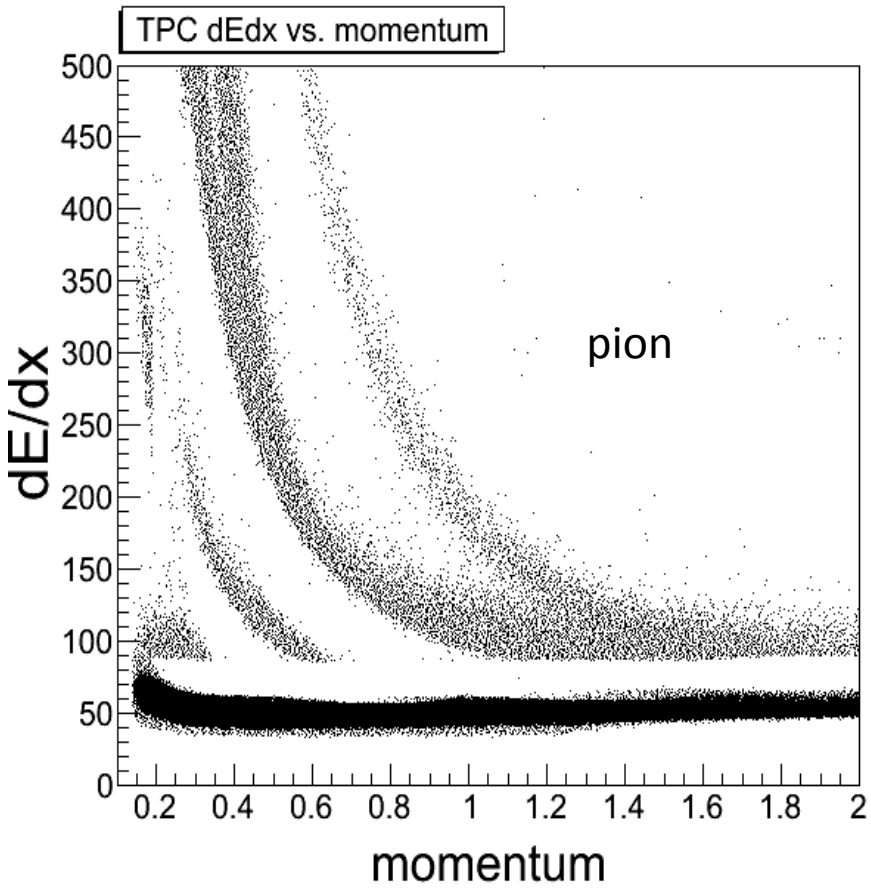
Pion: (0.13956995 GeV)	Kaon: (0.493677 GeV)
$0.14 < p_T < 10$	$0.14 < p_T < 10$
$-1.2 < \eta < 1.2$	$-1.2 < \eta < 1.2$
Minimum TPC clusters: 80	Minimum TPC clusters: 80
TPC Chi2Ndof < 4.0	TPC Chi2Ndof < 4.0
$(DCA)_{XY} < 0.25$	$(DCA)_{XY} < 0.25$
$(DCA)_Z < 0.15$	$(DCA)_Z < 0.15$

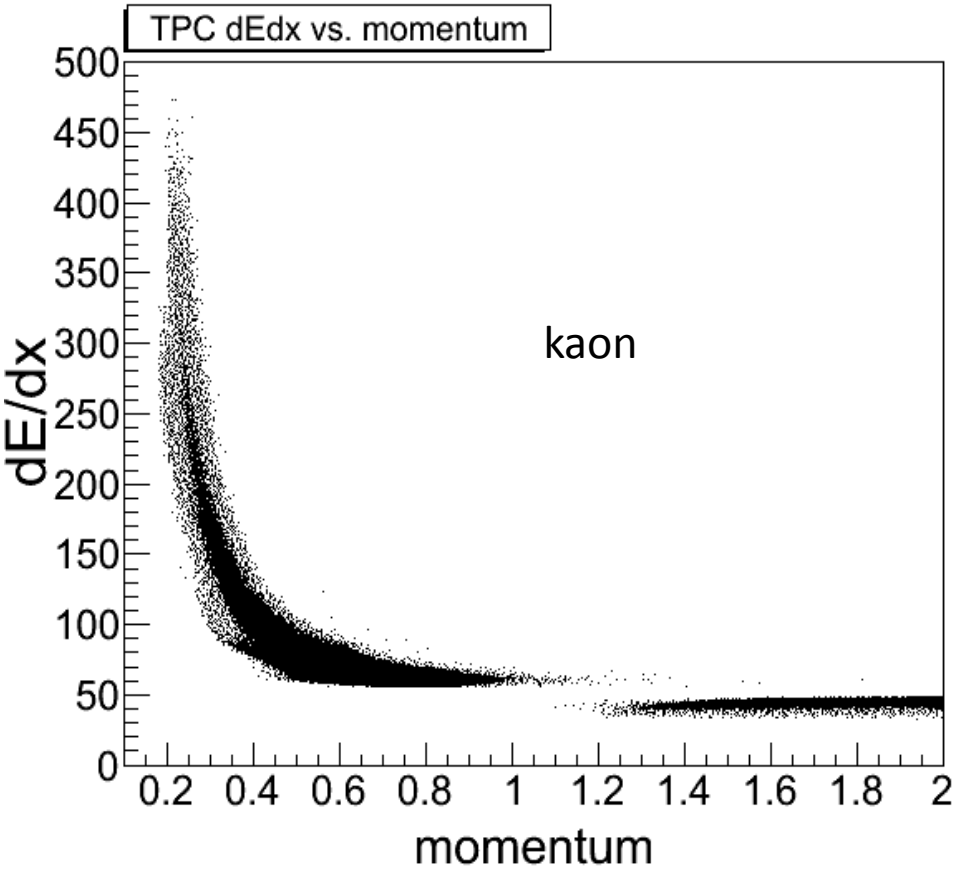
Pair selection:

Pair rapidity: $\pm$ 0.8

Opening angle: 11.459 to 180

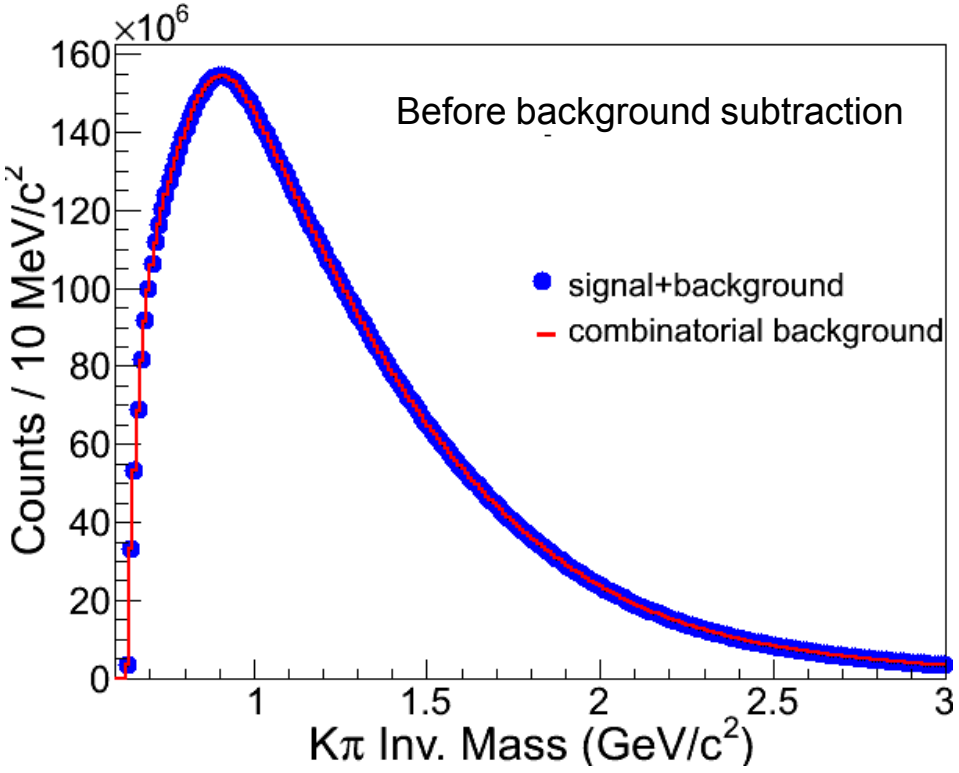
PID Selection

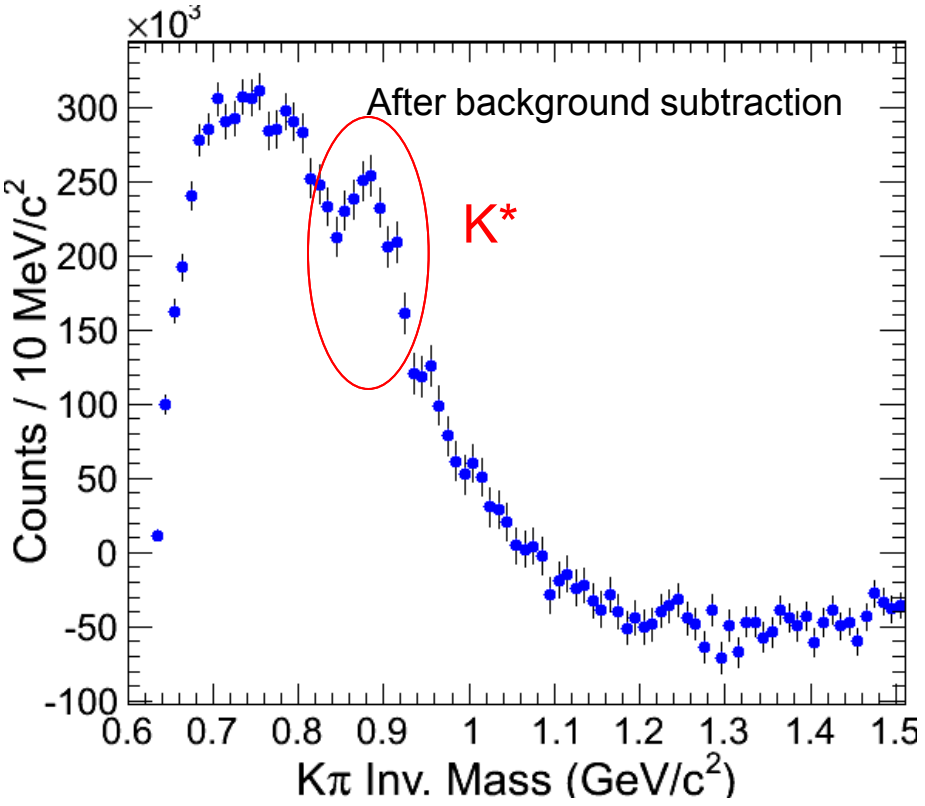




Results

Invariant mass distribution:

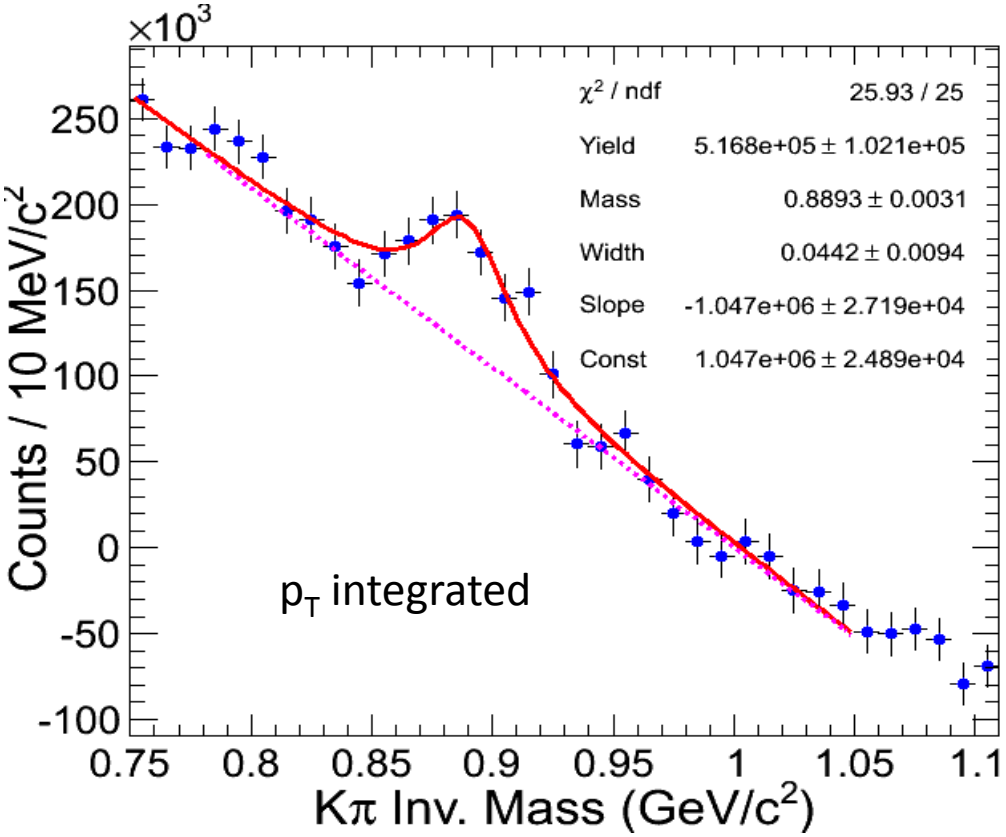




The signal was obtained by subtracting the combinatorial background distribution (through mixed event technique) from the kaon-pion invariant mass distribution.

Results

K* signal:



Signal: Breit – Wigner function

$$\left[\frac{\Gamma_0}{(M-M_0)^2+\frac{\Gamma_0^2}{4}}\right]$$

Background: Linear function

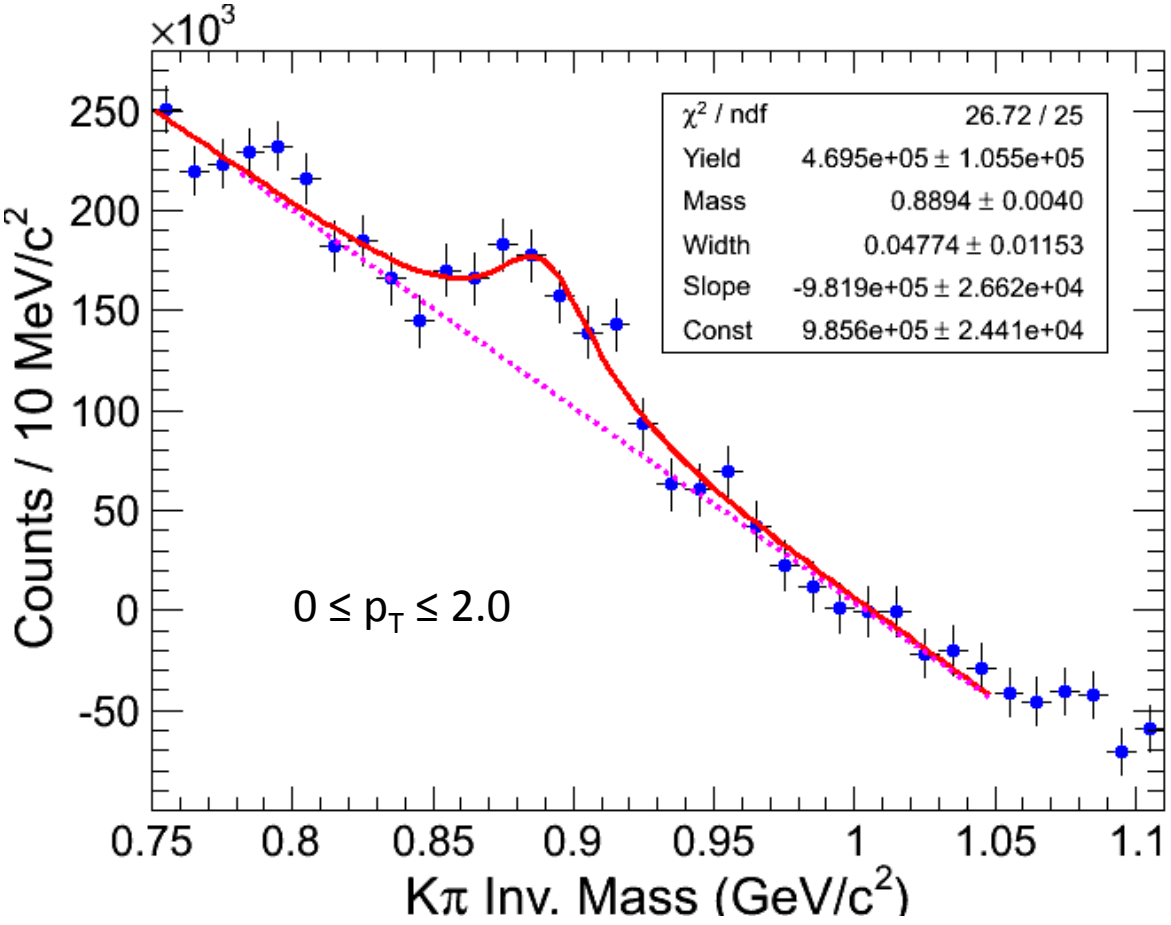
PDG Value:
Mass = 895.94 ± 0.22 MeV
Width = 48.7 ± 0.8 MeV

Mass = 889.3 ± 3.1 MeV
Width = 44.2 ± 9.4 MeV

The signal was obtained by subtracting the combinatorial background distribution (through mixed event technique) from the kaon-pion invariant mass distribution.

Results

K* signal:



PDG Value:
Mass = 895.94 ± 0.22 MeV
Width = 48.7 ± 0.8 MeV

Mass = 889.4 ± 4.0 MeV
Width = 47.7 ± 11.1 MeV

To do lists:

- K* with other centralities with higher statistics
- PID selection
- Invariant mass distribution in different p_T bin