K* meson production in proton proton collisions at center of mass energy 200 GeV

P. Shukla and R.K. Choudhury for PHENIX collaboration
Nuclear Physics Division,
Bhabha Atomic Research Centre,
Trombay, Mumbai 400 085, India

PHENIX is one of the major detectors at Relativistic Heavy Ion Collider (RHIC), BNL to search for Quark Gluon Plasma (QGP) [1]. Many signals measured at RHIC point to the formation of QGP in AuAu collisions at RHIC [2]. Detailed properties of this phase of matter is now the subject of study at RHIC. The K* meson is a rich probe of the properties of QCD matter produced at relativistic heavy ion collisions. The mass, width and yields of K* in comparison with other mesons such as give the information on the type of interactions taking place in hot quark-gluon and hadronic media. This is also important for understanding the particle production mechanism in pp and heavy ion collisions. In this work, we present current status of the measurement of the K* in pp collisions at $\sqrt{s} = 200$ GeV via its hadronic decay to K and using the PHENIX detector. The K* is studied at intermediate and high transverse momentum p_T regions from 0.5 to 7 GeV/c.

Figure 1 shows the K* mass peak in pp collision at center of mass energy 200 GeV in the p_T range 1.4 to 1.7 GeV/c extracted from 1 billion events. The signal is fitted to a relativistic Breit Wignor and the background is a second order polynomial. Figure 2 shows the p_T distribution per event in pp collision at 200 GeV. The STAR experiment [3] measured the p_T distribution of K* upto 3.0 GeV/c. The present measurement extends it upto 7.5 GeV. This will facilitate the study of the medium effects at high p_T where the effects due to the presence of quark gluon plasma are dominant. The fit shown in Fig. 2 is Levy function described as

$$f(p_T) = \frac{1}{2\pi}\frac{dN}{dy}\frac{(n-1)(n-2)}{(\Gamma + m_0(n-1))(\Gamma + m_0)} \left(\frac{\Gamma + \sqrt{(p_T^2 + m_0^2)}}{\Gamma + m_0}\right)^{(-n)}, \quad (1)$$

where Γ is the spectral width, n is the power and m_0 is particle mass taken to be 0.896 GeV.

The techniques used for the measurement of the K* spectrum in pp collisions are established and will be used to set the baseline for later studies of properties of matter produced in dAu and AuAu collisions. The results and status of this analysis will be presented.

References

[1] K. Adcox et. al. (PHENIX Coll.), Nucl. Instrum. Methods A499, 469 (2003) and references therein.
[2] K. Adcox et. al. (PHENIX coll.), Nucl. Phys. A757, 184 (2005).
[3] J. Adams et. al. (STAR coll.), Phys. Rev. C71, 064902 (2005).

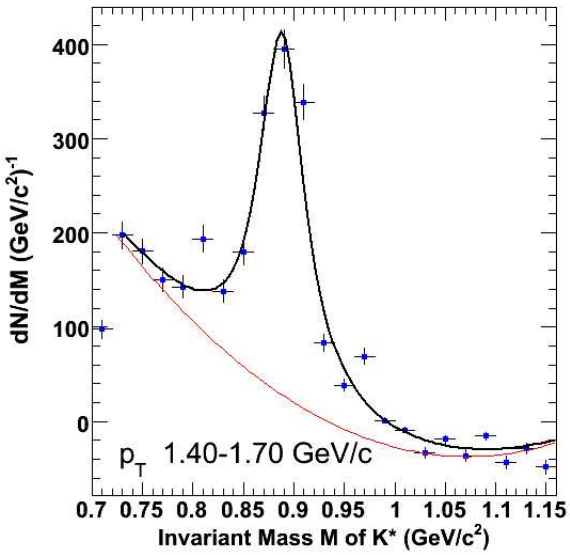

FIG. 1: The K* mass peak in pp collision at center of mass energy 200 GeV in the p_T range 2.0 to 2.6 GeV/c.

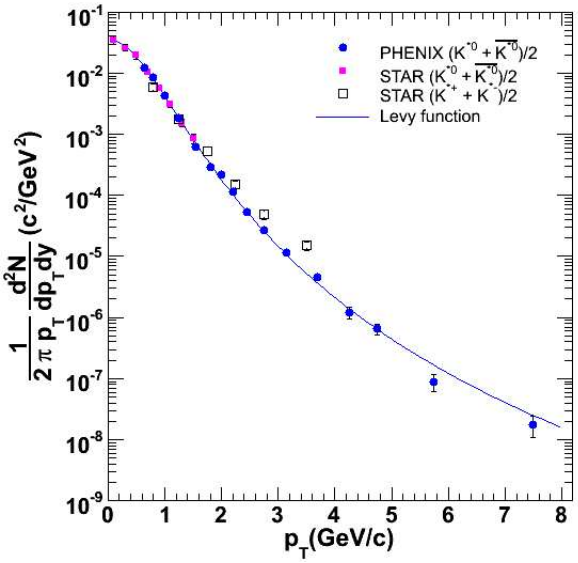

FIG. 2: The K* transverse momentum distribution in pp collision at center of mass energy 200 GeV.