K*± production in Pb-Pb collisions at LHC

Prottay Das (for the ALICE collaboration)
National Institute of Science Education and Research
HBNI, Jatni India

Outline:
✔ Motivation
✔ Signal extraction
✔ Results
✔ Summary
### Motivation

- **Resonances**: Short lived particles which decay via strong interaction

  \[ \rho^0 (1.3) < K^* (4.16) < \Sigma^* (5.0) < \Lambda^* (12.6) < \phi (46.2) \]

- **Hadronic phase**: Phase between chemical and kinetic freeze-out

  Resonances are a good tool to probe rescattering vs regeneration effect in the hadronic phase

  The measurement of the \( K^{*\pm} \) resonance production is presented

<table>
<thead>
<tr>
<th>Properties of ( K^{*\pm} )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass (GeV/c^2)</td>
<td>0.891</td>
</tr>
<tr>
<td>Width (GeV/c^2)</td>
<td>0.050</td>
</tr>
<tr>
<td>Spin</td>
<td>1</td>
</tr>
<tr>
<td>Quark content</td>
<td>( u \bar{s} )</td>
</tr>
<tr>
<td>Decay mode</td>
<td>( K^0_s \pi )</td>
</tr>
<tr>
<td>B.R (%)</td>
<td>33.3</td>
</tr>
</tbody>
</table>
Signal extraction

Collision system: Pb-Pb
\( \sqrt{s_{NN}} = 5.02 \text{ TeV} \)
Events: 120 M

✔ Invariant mass method:
\[
M_{K^0\pi^\pm} = \sqrt{\left( (E_1 + E_2)^2 - (\vec{p}_1 + \vec{p}_2)^2 \right)}
\]

✔ Combinatorial bkg: Mixed Event
✔ Fit function:
  ● Signal: Breit-wigner
  ● Residual background: Exponential+quadratic

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Results

Transverse momentum spectra

- Inverse slope of $p_T$ spectra increases with increasing multiplicity
- $dN/dy$, $<p_T>$ of $K^{\pm}$ is consistent with $K^{*0}$ within uncertainties
- $K^{*\pm}$ yield at 5.02 TeV and $K^{*0}$ yield at 2.76 TeV are similar at similar $dN_{ch}/d\eta$
- $<p_T>$ increases with multiplicity and mass of hadrons
- Mass ordering in $<p_T>$ is obeyed in central collisions but breaks down in peripheral collisions

Normalized yield

Mean transverse momentum

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Results

- ✔ K*/K yield yield ratio decreases with increasing system size, in contrast to φ/K yield ratio which remains constant
- ✔ Rescattering dominates over regeneration
- ✔ Models with rescattering effect (MUSIC+SMASH and HRG-PCE) qualitatively describe the data

Summary

- ✔ First measurement of K*± is presented in Pb-Pb collisions at 5.02 TeV
- ✔ dN/dy of K*± depends on event multiplicity
- ✔ In central collisions <p_T> follows mass ordering
- ✔ Particle ratios study shows evidence of rescattering effect similarly like K*0