K*± production in Pb-Pb collisions at LHC

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Outline:
✓ Introduction
✓ Signal extraction
✓ Results
✓ Summary
Introduction

✔ Resonances: Short lived particles which decay via strong interaction
✔ $K^{*\pm}$ resonance is interesting because of its very short lifetime (~4 fm/c), comparable to that of the hadronic phase
✔ $K^{*\pm}$ measured yield is affected by rescattering and regeneration effects
✔ Recent measurement shows evidence of suppression of $K^{0}/K$ with increasing multiplicity

MOTIVATION

✔ Similar measurement with $K^{*\pm}$ will confirm and complement the published $K^{0}$ results
✔ The first excited state measurements of kaon family is completed
Signal extraction

<table>
<thead>
<tr>
<th>Dataset</th>
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<tbody>
<tr>
<td>Collision system</td>
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<tr>
<td>$\sqrt{s_{\text{NN}}}$</td>
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<tr>
<td>Events</td>
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**Invariant mass method:**

$$M_{K_s^0\pi} = \sqrt{\left( (E_{K_s^0} + E_{\pi})^2 - (\vec{p}_{K_s^0} + \vec{p}_{\pi})^2 \right)}$$

**Combinatorial bkg:** Mixed event

**Fit function:**
- Signal: Breit-Wigner
- Residual background: Exponential + 2$\text{nd}$ order polynomial
Results

- Transverse momentum spectra
- Normalized yield
- Mean transverse momentum

✔ Inverse slope of $p_T$ spectra increases with increasing multiplicity
✔ Normalised yield decreases with increasing multiplicity
✔ Normalised yield of $K^*$ is similar for 5.02 TeV and 2.76 TeV at similar $\langle dN_{ch}/d\eta \rangle$
✔ $\langle p_T \rangle$ increases with multiplicity
✔ $\langle p_T \rangle$ of proton is less than that of $K^*, \Phi$ in peripheral collisions
Results

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

Summary

✔ First measurement of K*± is presented in Pb–Pb collisions at √s_{NN} = 5.02 TeV
✔ Event multiplicity drives K* yield
✔ <p_T> increases with multiplicity due to radial flow
✔ K*±/K yield ratio decreases with increasing system size
✔ HRG-PCE model and MUSIC+SMASH simulations qualitatively explain the measurements
✔ Results consistent with evidence of rescattering effects in the hadronic phase