Two-particle correlations with high-$p_T$ $K_0^*$ mesons in pp collisions at ALICE

Motivation
1. Results from $e^+e^-$ collisions for gluon and quark jets show:
   - Gluon jets have higher multiplicity
   - Gluon jets are wider
   - Gluon jets exhibit 40% higher production of $\Lambda$ baryons, equal production of $K_0^*$ mesons [1]

2. Strangeness enhancement in small collision systems

Dihadron correlations
- Trigger particle - high $p_T$ → proxy for hard-scattered parton
- Associated particle - lower $p_T$
- Difference:
  \[ \Delta p_T = p_{T,\text{trigg}} - p_{T,\text{assoc}} \] (1)
  \[ \Delta \phi = \phi_{\text{trigg}} - \phi_{\text{assoc}} \] (2)

In presented results:
- $K_0^*$ mesons and charged hadrons as trigger particles with $p_{T,\text{trigg}} > 3$ GeV/$c$
- Charged hadrons as associated particles
  \[ 10 < p_{T,\text{assoc}} < 15 \text{ GeV}/c \]
- Correlation function (schematically):
  \[ \rho_{\Delta p_T,\Delta \phi} = \frac{d^2N_{\Delta p_T,\Delta \phi}}{d\Delta p_T d\Delta \phi} \]

Per-trigger associated yields as a function of $p_T^{\text{assoc}}$ and multiplicity

Per-trigger associated yields as a function of $p_T^{\text{assoc}}$

Comparison with models
- PYTHIA8 does not describe quantitatively the yields as a function of $p_T^{\text{assoc}}$, neither for h nor for $h-h$ correlations (Plots above), which is mostly caused by the overestimation of the yield for lowest $p_T^{\text{assoc}}$ bin (Plots left), which dominates in $p_T^{\text{assoc}}$ inclusive bin
- EPOS and PYTHIA8 describe the yield spectra as a function of $p_T^{\text{assoc}}$ better, mainly in the low $p_T$ region (Plot right)
- Ratios to h-h correlations are described by PYTHIA8 best, EPOS overestimates the ratio stronger for higher multiplicity classes. PYTHIA6 describes the ratio at the upper side quite well and overestimates it slightly at the rear-side (Plots below)

Corrections
- $\epsilon_{\text{assoc}}$: two-particle detector acceptance, using mixed events
- $\epsilon_{\text{trigg}}$ and $\epsilon_{\text{assoc}}$: single-particle efficiency, from MC
- $C_{\text{corr}}$: Secondary contamination in primary hadrons, from MC
- Misidentified V$^0$: done after $\Delta \phi$ projection and background subtraction using sideband subtraction

Summary and Outlook
- None of the used MC models describes both yields and ratio to h-h correlations well
- Ratios to h-h correlations as a function of $p_T^{\text{assoc}}$ are mostly flat for all multiplicity classes
- Ratios to h-h correlations as a function of $p_T^{\text{assoc}}$ show a rising trend with increasing $p_T^{\text{assoc}}$, what is described with PYTHIA8
- Coming soon: comparison to $(A+\bar{A})$-$h$ and $h$-$(A+\bar{A})$ correlations to provide information on quark vs. gluon jets

References

Lucia Anna Husová for the ALICE Collaboration
lhusova@uni-muenster.de, Institut für Kernphysik, Münster