Strangeness production in near-side and away-side jets in pp collisions at ALICE using azimuthal correlations

Motivation
- Enhancement of $\Lambda/K^0_s$ observed in p-Pb and Pb-Pb collisions [1, 2]
- Understanding particle production mechanisms in soft and hard processes
- Measuring the $\Lambda/K^0_s$ ratio in jets and in the underlying event is a possibility to further investigate this enhancement
- Need to measure a baseline in pp collisions as a point of comparison to Pb-Pb collisions

$\Lambda$ and $K^0_S$ reconstruction
- $\Lambda$ and $K^0_S$ ($\pi^0$) can be reconstructed over a wide range of transverse momentum ($p_T$) via their decay topology $\pi^0 \rightarrow \gamma \gamma$
- Extract the peak position and width by fitting the invariant mass of $\pi^0$s in $p_T$ intervals with a Gaussian + linear function
  - Choose signal candidates in 6$\sigma$ region around the peak

Azimuthal correlations
- Correlation between charged leading track (trigger, $6 < p_T < 12$ GeV/c) and associated $\pi^0$s ($1 < p_T < 6$ GeV/c) are measured using the correlation function $C(\Delta \phi, \Delta \eta)$

$$C(\Delta \phi, \Delta \eta) = \frac{1}{N_{\text{Trig}}} \int d^2N_{\text{assoc}} \frac{dN}{d\Delta \phi d\Delta \eta} B(\Delta \phi, \Delta \eta)$$
- We measure the Signal (S) via same event pairs (left plot) and the Background (B) via mixed event pairs (right plot)

$$\beta$$ is the normalization factor used to normalize mixed event distribution to 1 at $(\Delta \phi, \Delta \eta) = (0,0)$

Feeddown correction
- In order to show a corrected $\Lambda/K^0_S$ ratio the As need to be feeddown corrected (remove As from $\Xi^-$ and $\Xi^+$) in the near-side, away-side, and underlying event regions
  - Investigating a novel data-driven feeddown correction using a distance of closest approach (DCA) scaling method in MC.
  - The feeddown fraction in measured $\Lambda$s is sensitive to the selection performed on the DCA of the V0 to the primary vertex (left plot)
  - By measuring the relative change of signal for different DCA selections, the amount of feeddown can be estimated (right plot)

Summary and outlook
- It has been shown that it is possible to classify the phase space as soft (underlying event) and hard (near-side, away-side) regions with respect to the charged leading track of the event
- We observe the near-side and away-side jets and the underlying event without full jet reconstruction. This shows the potential of using azimuthal correlations to probe jet-sensitive physics
- Novel feeddown method will greatly help to pin down a true yield in the soft and hard regions, allowing for an accurate representation of the primary $\Lambda/K^0_S$ ratio in jets

References
2. ALICE Collaboration, Phys. Rev. Lett. 111, 222301