D-tagged jet production and fragmentation measurements in pp collisions with ALICE

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Motivation

- D mesons: sensitive probes of perturbative QCD, down to low p_T
- D-tagged jets:
  - Further constrains on heavy-quark production mechanism and its fragmentation
  - Constrains on gluon fragmentation function [1]
- D mesons: full reconstruction of hadronic decays
  \[ D^0 \rightarrow K^- \pi^+ \Tiny{(BR=3.89 +/- 0.04\% [2])} \]
- Replace D-meson daughter particles with the D meson
- Jet reconstruction with FastJet anti-k_T algorithm: charged-particle tracks, R=0.3,0.4
- Tagging: D meson as the jet constituent

Method

- Invariant mass analysis
- Correction for the D-jet efficiency
- Subtraction of the B feed-down component: POWHEG-based method
- Unfolding for the detector effects

\[ \sqrt{s} = 5.02 \text{ TeV} \]
\[ \sqrt{s} = 7 \text{ TeV} \]
\[ \sqrt{s} = 13 \text{ TeV} \]

\( p_T \)-differential cross-section

Momentum fraction distribution \( z \) at \( \sqrt{s} = 7 \text{ TeV} \) \[ z_\parallel = \frac{p_D}{p_{\text{jet}}} - \frac{p_D}{p_{\text{jet}}} \]

Conclusions

- Cross-section: (i) agreement with NLO pQCD predictions from POWHEG+PYTHIA6 (hvq)
  (ii) overestimated by PYTHIA6,8 and HERWIG 7
- Momentum fraction: (i) agreement with models (ii) hints of softer fragmentation in data at higher jet p_T

Outlook

- More precise momentum fraction measurements with pp data at \( \sqrt{s} = 5.02, 13 \text{ TeV} \) coming soon

References:

[1] D.P.Anderle et al., PRD 96, (BR=3.89 +/- 0.04\% [2]) 2017)
[2] PDG, PRD 98 no. 3, (BR=3.89 +/- 0.04\% [2]) 2018