# D* production vs multiplicity in pp collisions at $\sqrt{s}$ = 13 TeV at the LHC


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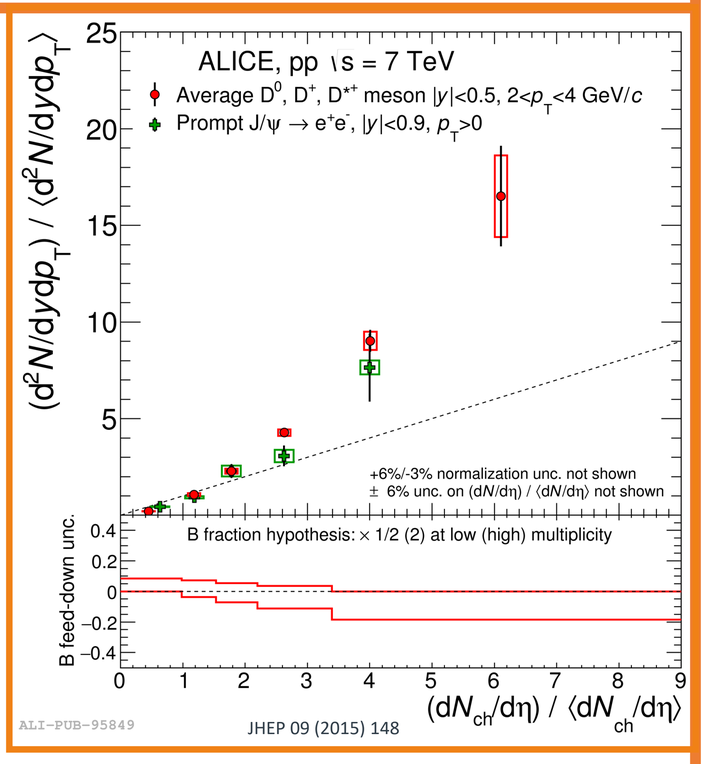
## Physics Motivation

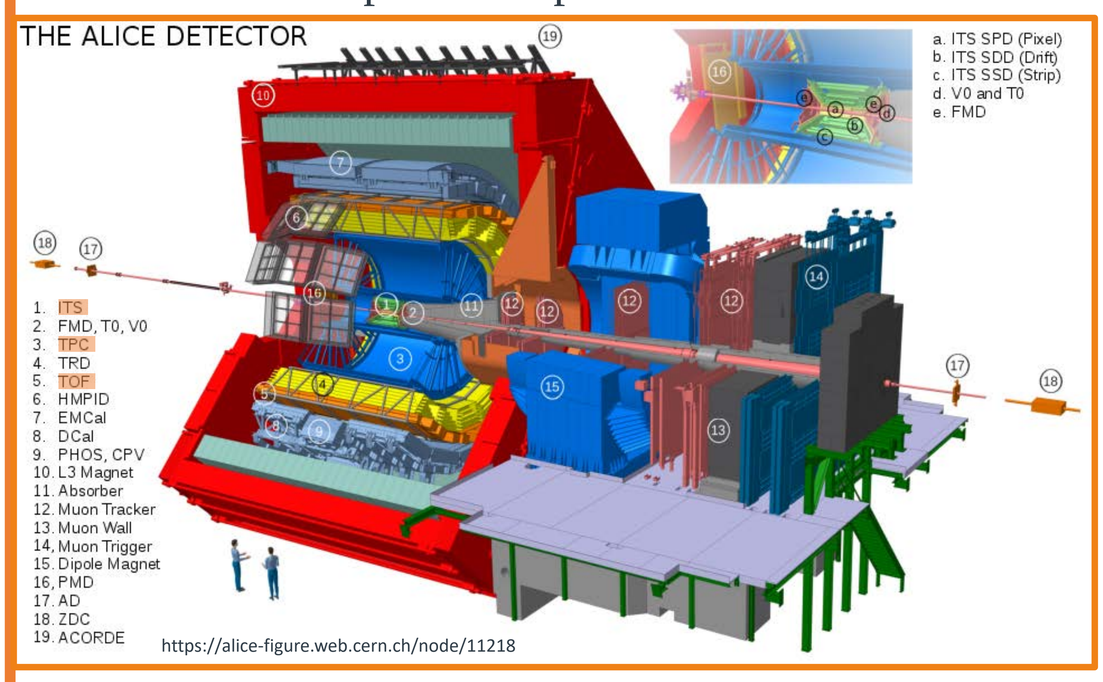
- The analysis of the D*-meson production as a function of multiplicity in pp collisions allows us to investigate the role of multi-parton interactions → they are expected to have a relevant role at high multiplicity in pp collisions at LHC energies
- Average D mesons and J/ψ measurement at 7 TeV show a stronger than linear increase
- New analysis at higher center of mass energy $\sqrt{s}$ = 13 TeV and with a larger data sample allows us to improve the precision of the results




## The Experiment

ALICE excellent capabilities for tracking and particle identification (PID) were used for the analysis discussed in this poster using in particular the detectors:

- Inner Tracking System (ITS), $|\eta| < 1$ → vertexing, tracking and multiplicity estimator
- Time Projection Chamber (TPC), $|\eta| < 0.9$ → PID and tracking
- Time Of Flight (TOF) , $|\eta| < 0.9$ → PID

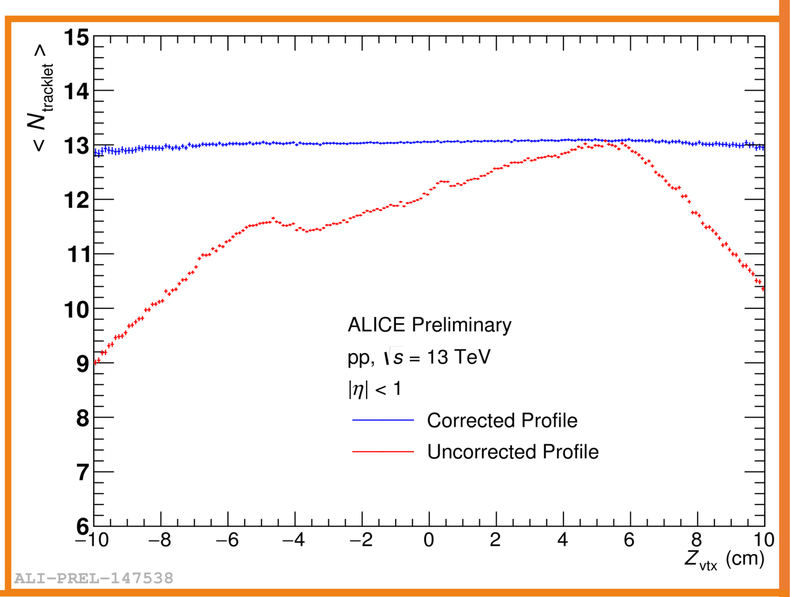



Datasets considered:

- 2016, 2017 and 2018 Minimum Bias triggered data (MB) → ~$1.7\times10^9$ events
- 2018 High Multiplicity triggered data (HMSPD)→ ~$115\times10^6$ in the multiplicity interval considered

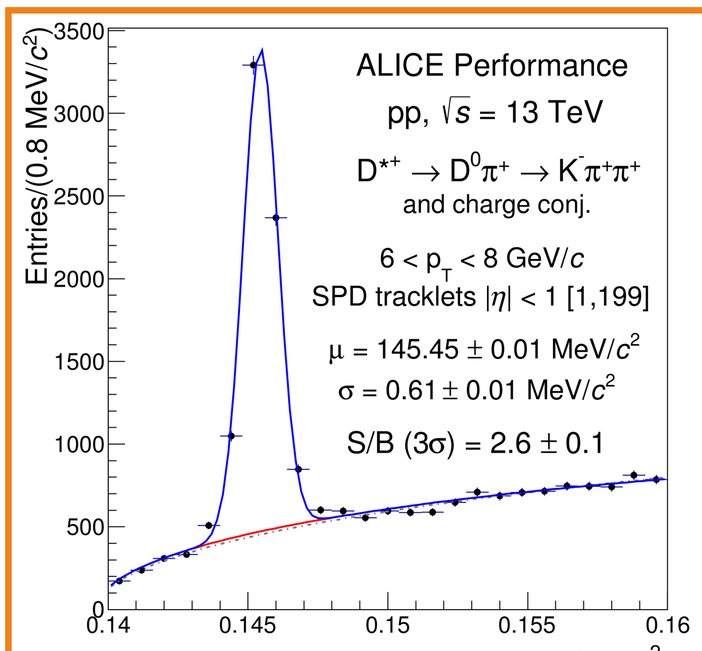
## Multiplicity estimator

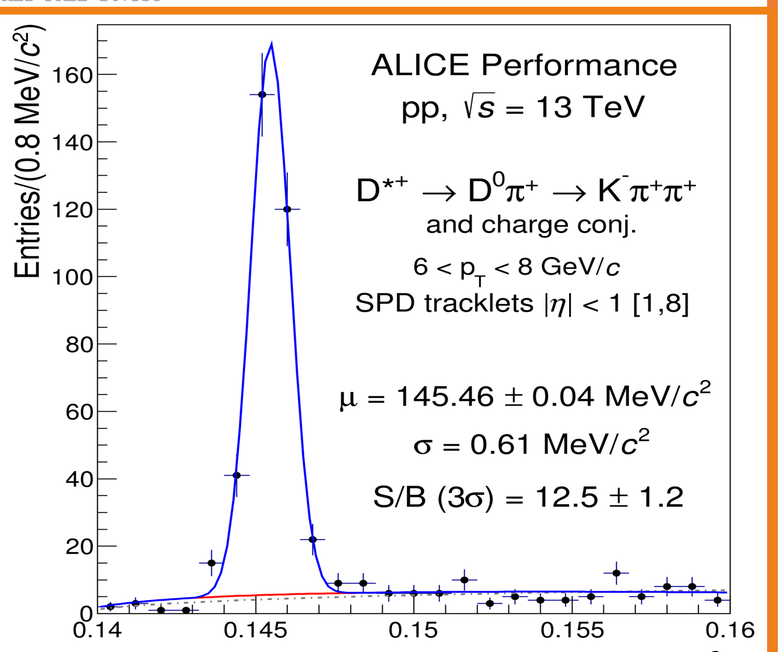
- Multiplicity is defined as the number of tracklets reconstructed in the SPD ($N_{trk}$) of the ITS
- The product of acceptance and efficiency of the detector depends on $Z_{vtx}$→ different for each data taking period
- $N_{trk}$ were corrected event-by-event leading to a flat profile




## Signal extraction

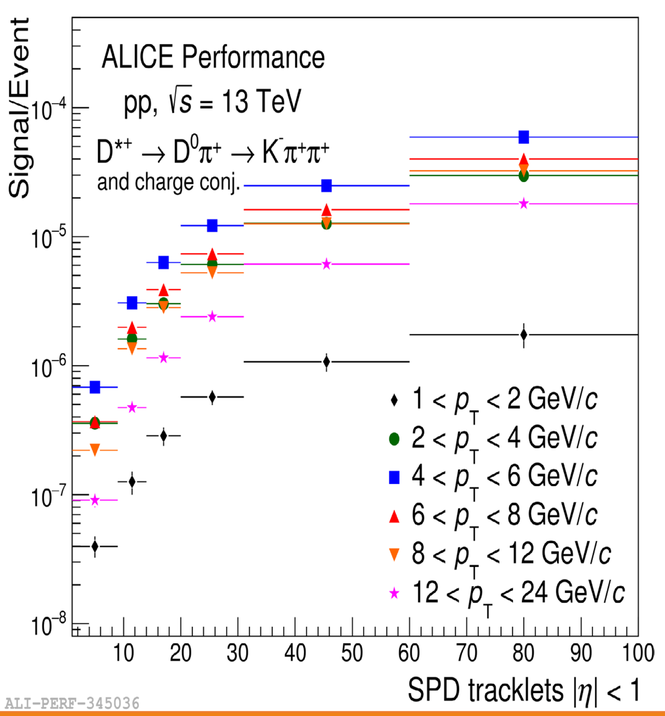
- Decay channel $D^{*+}\rightarrow D^0\pi^+$ (and charge conjugate)
- Topological and PID selections applied to pair a $D^0$ candidate ($D^0 \rightarrow K^-\pi^+$ and c. c.) with a soft pion at the primary vertex
- Fit performed on the invariant mass plots using a Gaussian function for the signal and an exponential with power function for the background

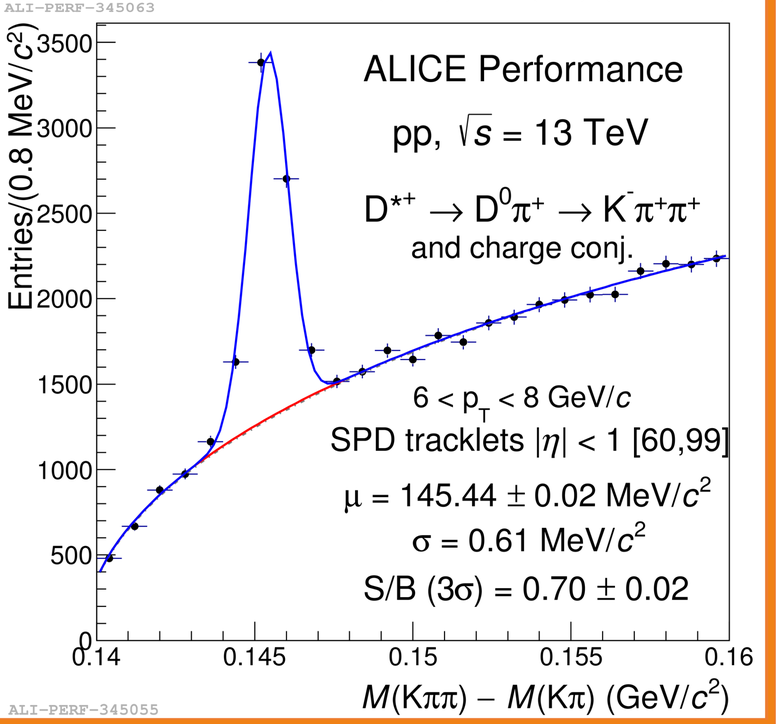


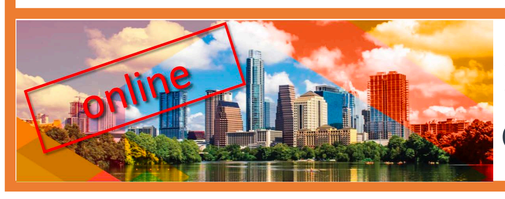




## Results

- The invariant mass plots shown in three different multiplicity intervals in the same $p_T$: MB events, 1-8 and 60-99 tracklets (HMSPD)
- Raw yields per event vs $N_{trk}$ for each $p_T$ interval share a similar shape → more signal obtained in the intermediate $p_T$ intervals
- Statistics is sufficient to extend the self-normalized analysis to higher $p_T$ and higher event multiplicities with respect to those at 7 TeV → to be done as next steps





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