

D meson production cross section in pp collisions at $\sqrt{s} = 7$ TeV measured with the ALICE detector at LHC



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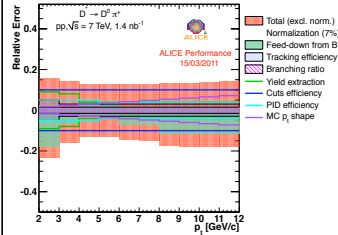
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Motivations

- ✓ Heavy quarks probe directly the gluon density of the colliding particles since gluon fusion processes dominate the production cross-section at high energies
- ✓ Measurement of D mesons cross-section essential for understanding of charm production in elementary pp collisions
- ✓ Relevance for measurement of charm energy loss in medium
- ✓ Relevance for suppression measurements of Quarkonia states in heavy-ion collisions, e.g., R_{AA} of D mesons.

Systematic errors

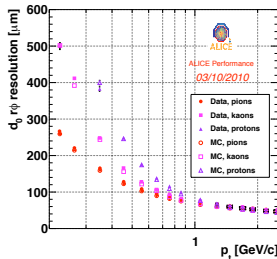


A detailed study of possible systematic sources was carried out. The B feed-down subtraction, monte-carlo based, is accounting for a 3-18% systematic depending on the p_T bin. The summary plot, with all the systematic sources taken into account is shown.

D meson reconstruction

ALICE D mesons reconstruction is based on the invariant mass analysis of the reconstructed secondary vertices. Topological selections and particle identification are used to suppress combinatorial background. In the following we will refer to the $D^{*+} \rightarrow D^0(K\pi^+)\pi^+$ meson. Similar results were obtained for D^0 and D^+ mesons.

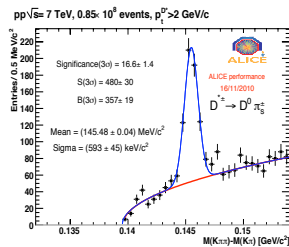
Displaced vertex reconstruction



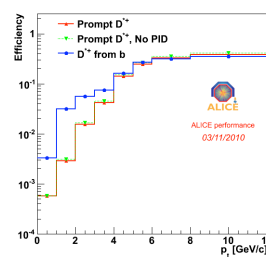
- Secondary vertex resolved using the silicon tracker (ITS). Figure on the left shows the resolution on d_0 impact parameter (d_0) versus p_T
- Time Projection Chamber (TPC) used for tracking and particle identification via dE/dx
- Time of Flight to identify kaons.
- Acceptance: $|\eta| < 0.9$

Invariant mass analysis

D^{*+} is seen, after selection cuts, as narrow signal in the mass difference $M(K\pi\pi) - M(K\pi)$. The position agrees, within the errors, with the world average. The width is 593 ± 45 keV/c². With the first 20% of 2010 data sample we got six p_T bins in the region [2,12] GeV/c.



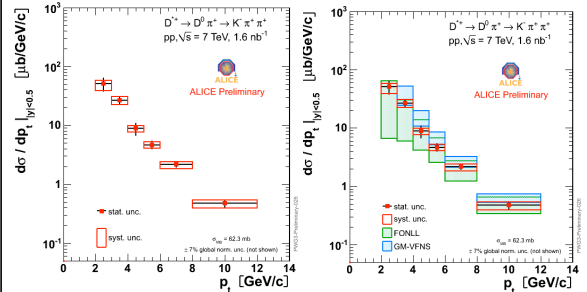
Efficiency for corrections



pp interactions were simulated using PYTHIA with Perugia-0 tuning. Only events with production of D mesons were transported through the apparatus and reconstructed. The efficiency is extracted (and shown) for prompt and secondary D mesons.

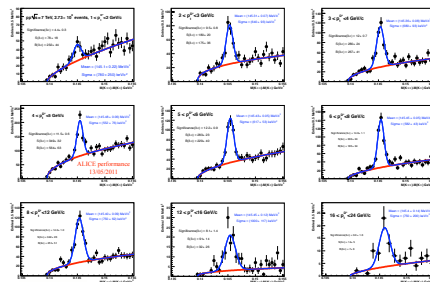
Cross section

The invariant cross section is evaluated in the p_T range [2,12] GeV/c. In figure on the left the cross section versus p_T is shown. On the right a comparison of the experimental points with FONLL and GM-VFNS is made.



Conclusions and Prospects

The excellent tracking system and PID of the ALICE experiment allows to extract the D mesons cross section in the p_T range [2,12] GeV/c with the first ~ 1.6 nb⁻¹, representing 20% of the 2010 minimum bias sample.



The analysis of the full data sample, as shown in figure, gives us confidence that the p_T reach can be extended to 1 GeV/c or below already with 2010 data. In the high p_T region we can go above 12 GeV/c.