Poster: Fragmentation functions of identified charmed mesons

Sara Sellam on behalf of the LHCb collaboration

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**Motivation**

**J/ψ Production:**

1. Production cross section is well described by NRQCD.
2. Large transverse polarisation is predicted.
3. Direct-production paradigm: isolated or within jets.

![Quarkonia production diagram](image)

![Graph](image)

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Jet fragmentation functions of prompt $J/\psi$-in-jet disagrees with theoretical prediction.

$\rightarrow J/\psi$ production is not isolated!
$J/\psi$ in jets

Analysis strategy:

(a) Compute the quarkonia ($Q$) signal yield for each $[z(Q) = \frac{p_T(Q)}{p_T(jet)} , p_T(jets)]$.

(b) Separate prompt from displaced (from b-hadron decays) using pseudo-lifetime fits: $t_z = (z_Q - z_{PV})\frac{m(Q)}{p_z(Q)}$.

(c) Unfold the $z(Q)$ distribution and measure normalised distributions of jet fragmentation function $d\sigma/\sigma$ vs $z$.

Goal: Expand the $J/\psi$ analysis to more states with higher mass and different quark content to see if these fragmentation functions also differ notably from the PYTHIA and NRQCD expectations. Uncover how tetra-quark states are produced within jets.
Production cross section already measured by LHCb using 13 TeV dataset.

We are able to reconstruct the fragmentation function over a wide $z_T$ range for both the $\chi_{c1}(3872)$ and the $\psi(2S)$ in multiple jet $p_T$ bins ranging from 5-60 GeV.

Our results will be compared with PYTHIA predictions and will be published soon!