J/ψ production as a function of event multiplicity in pp collisions at $\sqrt{s} = 13$ TeV using EMCal-triggered events with ALICE at the LHC

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Motivation

✓ J/ψ production in multiplicity classes as a function of the chargedparticle multiplicity can give insights about the interplay between hard and soft processes.

✓ Increase of $p_{\rm T}$ -integrated J/ ψ yield as a function of charged-particle multiplicity was observed in pp collisions at $\sqrt{s} = 7$ TeV [1] and 13 TeV [2].

✓ Behaviour attributed to underlying process, including multi-parton interactions.
 ✓ Analysis for different <p_T> of J/ψ provides more constraints to the model calculations, leading to a better understanding of the physics interpretation of the enhancement.



ALICE

HEPIC

electrons.



10. L3 Magnet 11. Absorber

12. Muon Tracke

13. Muon Wall 14, Muon Trigger 15. Dipole Magnet

16. PMD

 $\checkmark J/\psi \rightarrow e^+e^-$ decay.

✓ Invariant mass distribution is used to reconstruct J/ψ .

✓ Electrons are identified via d*E*/d*x*.
(-2.25 < (d*E*/d*x* - <d*E*/d*x* >_e) < 3) in the TPC.
✓ One of the legs has to be in EMCal:

Analysis strategy ✓ Multiplicity classes are selected using the number of tracklets reconstructed by SPD detector.



• E/p (0.8 < E/p < 1.3), where E is the energy measured in the EMCal and p is the track momentum. • E > 5 GeV ($p_T > 5$ GeV/c) for lower trigger threshold. • E > 7 GeV ($p_T > 7$ GeV/c) for higher trigger threshold. • Signal + background (opposite signal counts) summed in 2.92 < $M_{e+e-} < 3.16$ GeV/ c^2 . • Background described by a pol2, fitted excluding the peak region (2.5 < $M_{e+e-} < 3.3$ GeV/ c^2). • Background removed from opposite signal counts.

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✓ Self-normalized inclusive J/ψ yield as a function of self-normalized charged-particle multiplicity.

✓ Low p_T analysis ($p_T < 8 \text{ GeV}/c$) performed using a high-multiplicity trigger.

✓ Analysis performed using the EMCal trigger in two $p_{\rm T}$ intervals:

Results and Conclusions



• $8 < p_T < 11 \text{ GeV}/c, < p_T > = 9.3 \pm 0.1 \text{ GeV}/c$ • $11 < p_T < 30 \text{ GeV}/c, < p_T > = 15.5 \pm 0.4 \text{ GeV}/c$

✓ The results indicate an enhancement of J/ψ yield as a function of self-normalized charged-particle multiplicity stronger than linear.

✓ Indication of stronger rise at higher $p_{\rm T}$.

✓ The results are well described by the PYTHIA 8 event generator.
 ✓ This hints to an important role of multiple interactions at the parton level for charm production in hadron-hadron collisions.

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References

[1] ALICE Collaboration, Phys. Lett. B712 (2012) 165–175
[2] S. Weber (for the ALICE collaboration), arXiv:1704.04735v2