Measurement of $J/\psi$ production in 5.02 TeV Pb+Pb and pp collisions with the ATLAS experiment

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The in-medium suppression of $J/\psi$ production in heavy-ion collisions, with respect to reference pp collisions, serves as a sensitive signature for studying the quark gluon plasma. A full assessment of the suppression requires understanding the effects present in the hot and dense medium in the Pb+Pb collisions as well as cold nuclear effects in the small p+Pb system. Based on Pb+Pb collision data collected in 2015 at the LHC, the ATLAS experiment has studied $J/\psi$ production via the dimuon decay channel. The charmonium states are separated into contributions from prompt production and B-hadron decays (non-prompt production).

A more detailed description of these results may be found in ATLAS-CONF-2016-109. For many more results from this analysis, see talk by J. Lopez on Tuesday.

Results

Resulting per-event yields and non-prompt fraction for $J/\psi$ production in 5.02 TeV Pb+Pb collision data, as a function of transverse momentum, for different centrality slices and rapidity range $|y| < 2$.

Correlated and uncorrelated systematic uncertainties are drawn separately, with a band for correlated systematics and an error box accounting for uncorrelated effects. The statistical errors are depicted as error bars.

Cross section for production of prompt and non-prompt $J/\psi$ mesons and non-prompt fraction as a function of $p_T$ is shown for central, mid and forward rapidities out to 40 GeV.

Summary

- Measurements were performed for the $J/\psi$ dimuon decay channel in Pb+Pb and pp collisions at 5.02 TeV with the ATLAS experiment.

- Good agreement between the data and the respective models in the pp cross section.

- $J/\psi$ production yields decrease with $p_T$ for both pp and Pb+Pb collision systems.

- The non-prompt fraction has been measured.

- These results indicate that the non-prompt fraction increases as a function of $p_T$ and there is no obvious dependence on centrality, within uncertainties. Also, the non-prompt fraction in Pb+Pb seems to be higher with respect to pp for $p_T < 10$ GeV. This suggests that prompt $J/\psi$ is more suppressed than non-prompt in that $p_T$ range.