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Characterizing the collective behavior in small and large systems with ATLAS

Friday 21 May 2021 10:30 (20 minutes)

Measurements of open heavy-flavor hadron production in proton-proton collisions provide a crucial baseline for interpreting measurements in nucleus-nucleus collisions, and allow for the investigation of the origin and underlying mechanism of collective effects in small systems.

These measurements are performed with the ATLAS detector at the LHC and capitalize on the large Run 2 pp dataset at 5.02 TeV and 13 TeV.

This talk presents published results on the azimuthal anisotropy (v_2 and v_3) of muons from heavy-flavor decays in 13 TeV pp collisions, as well as new results on the heavy-flavor muon production cross-section in 5.02 TeV pp collisions.

In both measurements, muons from charm and bottom hadrons with $p_T > 4$ GeV are statistically separated using the transverse impact parameter with respect to the primary collision vertex.

Muons from charm hadrons are found to have a significant azimuthal anisotropy in high-multiplicity pp collisions, with a magnitude and p_T-dependence similar to that for light hadrons.

On the other hand, the anisotropy for muons from bottom hadrons is significantly smaller, compatible with zero, demonstrating a strong mass dependence for collective effects in small systems.

Additionally, the differential cross-section for charm and bottom muon production in 5.02 TeV pp collisions is presented and compared to FONLL predictions.

We discuss this measurement in the context of similar data-theory comparisons in pp collisions at other experiments and collision energies.

Collaboration

ATLAS collaboration

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