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The role of the underlying event in the heavy-flavor baryon enhancement

Recent experimental results, coming from ALICE and CMS, show a low-pT enhancement of charm baryon production over model predictions, which are based on e+e- collisions. This new development challenges the assumption that the fragmentation function is universal, i.e. independent of the collision system [1,2]. Several scenarios have been proposed to explain the discrepancy between the predictions and the experimental data, including the enhanced color re-connection model [3], which is capable of describing the charm enhancement in pp collisions.

We studied the charm-baryon enhancement in collision events generated by PYTHIA 8 and applied the enhanced color-reconnection model. We proposed a measurement method based on several event-activity classifiers, to identify the origin of the charm-baryon enhancement. Our conclusion is, that within the scenario under investigation, the excess charm production is connected to the underlying event and is independent of the jet production [4].

Our studies have been extended to higher mass baryons, and also explored the role of the isospin [5]. Finally, we made predictions for the beauty-baryon production and its modification by the underlying event. These new observables we explored, provide a unique opportunity in the upcoming measurements from the high-luminosity LHC Run 3 period to better understand the charm and beauty fragmentation mechanisms, and will help the further development of models.

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