Heavy-flavor particle correlations in STAR via electron azimuthal correlations with open charm mesons

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The study of heavy-flavor production in heavy-ion collisions provides key tests of parton energy-loss models and, thus, yields profound insight into the properties of the produced highly-dense QCD matter. Surprisingly, RHIC measurements in central gold-gold collisions have shown that the high-p_T production of electrons from semi-leptonic charm and bottom decays is suppressed to the same level as observed for light-quark hadrons, which was not expected owing to the dead-cone effect. Energy-loss models describe the observed suppression reasonably well only if the bottom contribution to the non-photonic electrons is very small. Since the measurements are sensitive to the sum of charm and bottom decays, it is of great interest to disentangle the relative contributions experimentally.

In this contribution, we report first STAR measurement on heavy-flavor particle correlations in proton-proton collisions. Heavy-flavor (charm and bottom) events are clearly identified and separated through their characteristic decay topology using azimuthal correlation of non-photonic electrons and reconstructed open charmed mesons, which yield important information about the underlying production mechanism. The specific advantage of this correlation method, in contrast to the conventional heavy-quark measurements, is the possibility to efficiently trigger on heavy-quarks with high transverse momentum using their decay electrons. The results are compared to dedicated simulations from PYTHIA and MC@NLO event generators. This novel correlation technique has the potential for comprehensive energy-loss measurements of heavy quarks in heavy-ion collisions.