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D_s elliptic flow as evidence of the sequential hadronization mechanism in the hot QCD medium

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Heavy flavor production serves as an ideal probe of the hadronization mechanism in the hot and dense QCD medium created in relativistic heavy-ion collisions. Heavy quarks acquire elliptic flow through strong coupling with the medium, making v_2 a sensitive observable for probing the hadronization time. In this Letter, we study the production and elliptic flow of D_s and D^0 mesons in $Pb+Pb$ collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV within a Langevin dynamics framework for heavy quarks in the QCD medium, combined with the sequential or simultaneous coalescence plus fragmentation at the hadronization hypersurface. We find that, within the sequential hadronization framework, the earlier-produced D_s exhibits a smaller v_2 than the D^0 in the intermediate $p_{\rm T}$ region. This reversed ordering behavior aligns with preliminary ALICE measurements and provides strong evidence for the heavy flavor sequential hadronization mechanism.

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