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Search for extreme electromagnetic fields through measurements of charm meson flow harmonics in PbPb collisions at $5.02\ \mathrm{TeV}$ with the CMS detector

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In ultrarelativistic heavy-ion collisions, a very strong (on the order of 10^{16} Tesla) and transient (lifetime on the order of 10^{-1} fm/c) electromagnetic (EM) field is expected to be generated inside the medium formed in the collision. This EM field, generated by the collision participants and spectators, is predicted to produce a difference in the v_n harmonics for positive- and negative-charged particles, with the magnetic field mainly responsible for a splitting in rapidity-odd directed flow (v_1), and the Coulomb electric field leading to a charge-dependent splitting in the v_2 and average p_T values of emitted particles. Because of their large mass, charm quarks are expected to be created very early in the collision, and thus have a better chance of interacting with this strong EM field than light flavor hadrons. In this talk, measurements of D^0 ($\bar{u}c$) and $\bar{D}^0$ ($u\bar{c}$) meson flow harmonics (v_1 and v_2) are presented as functions of rapidity (y), transverse momentum (p_T), and collision centrality for PbPb collisions at 5.02 TeV, using high statistics data samples collected by the CMS detector during the LHC Run 2. The results are compared to model calculations, where they provide important constraints on the electrical conductivity and the drag coefficient assumed for the QGP medium. The wide rapidity coverage ($|y| < 2$) of these new charm mesons measurements allow for a better understanding of the 3-dimensional evolution of the medium formed in heavy-ion collisions.

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