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Charge balance function and fluctuation with CMS at the LHC

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We present the first studies of charge-balance functions using the broad rapidity coverage of the CMS experiment. This larger phase space region is essential for studying the system time evolution. The width of the balance function, both in relative $|\eta|$ and relative azimuthal angle, is found to decrease with multiplicity for low particle transverse momentum ($p_T < 2 \text{ GeV}/c$). The effect is observed for both collision systems, and it is consistent with a late hadronization scenario, where particles are produced at a later stage during the system evolution. The multiplicity dependence is weaker for higher p_T , which signifies that the balancing charge partners are strongly correlated compared to the low- p_T region. Model comparisons cannot reproduce the multiplicity dependence of the width in $\Delta\eta$, albeit a model which incorporates collective effects can reproduce the narrowing of the width.

Auteur principal: PUJAHARI, Prabhat Ranjan (IIT Madras)

Orateur: PUJAHARI, Prabhat Ranjan (IIT Madras)