

# Event-by-event study of charge separation in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV with the ALICE experiment

Kharzeev *et al.* [1] proposed strong P and CP violation in the hot dense matter created in non-central heavy-ion collisions. The strong magnetic field ( $B \sim 10^{15}$  T) induces a separation of electric charge along the direction of the magnetic field resulting in the Chiral Magnetic Effect (CME). This effect has been experimentally observed by the ALICE experiment for Pb-Pb collisions at  $\sqrt{s_{NN}} = 2.76$  TeV via multi-particle correlators [2]. We will present an event-by-event study of the localized charge separation effect in Pb-Pb collisions at  $\sqrt{s_{NN}} = 2.76$  TeV using the Sliding Dumbbell Method (SDM) which is similar to the Sliding Window Method (SWM) [3] used for neutral-charged fluctuations in Pb-Pb collisions at 158 A GeV at the SPS. In this method, we are calculating the fraction  $Db_{+-}$ , which is the sum of the positive charge fraction on the left side of the dumbbell and the negative charge fraction on the right side of the dumbbell. The whole azimuthal plane is scanned by sliding a dumbbell of size  $\Delta\phi = 90^\circ$  in steps of  $\delta\phi = 1^\circ$  and calculating  $Db_{+-}$  for each  $\Delta\phi$  region to extract the maximum value of  $Db_{+-}$  in each event.  $Db_{+-}$  distributions obtained using the SDM are compared with those of randomly selected dumbbells in each event. The results are presented for different dumbbell sizes of  $\Delta\phi = 90^\circ, 60^\circ$  and  $40^\circ$ .

[1] D. Kharzeev, *et al.* (ALICE Collaboration), Phys. Lett. B **633**, 260 (2006).

[2] B. Abelev, *et al.* (ALICE Collaboration), Phys. Rev. Lett. **110**, 012301 (2013).

[3] M.M. Aggarwal, G. Sood, Y.P. Viyogi, Phys. Lett. B **638**, 39 (2006).

## Preferred Track

Correlations and Fluctuations

## Collaboration

ALICE

**Primary author:** Ms PARMAR, Sonia (Panjab University (IN))

**Presenter:** Ms PARMAR, Sonia (Panjab University (IN))

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