

# Quark Matter 2019 - the XXVIIIth International Conference on Ultra-relativistic Nucleus-Nucleus Collisions



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## Investigate the possible physics mechanisms of the CMW-like flow signals

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The interplay between the chiral magnetic effect and the chiral separation effect can lead to a collective excitation, a phenomenon called Chiral Magnetic Wave (CMW). Previous measurement of a positive slope for the charge asymmetry ( $A_{\text{ch}}$ ) dependence of the  $\pi^+$  and  $\pi^-$  flow difference  $\Delta v_2(A_{\text{ch}}) \equiv v_2^{\pi^-}(A_{\text{ch}}) - v_2^{\pi^+}(A_{\text{ch}})$ , indicated effects that are consistent with the CMW, but firm conclusions have not been established because of possible background contaminations in those measurements. In this work, we study the effects of resonance decays (local charge conservation) and find strong sensitivities of the  $\Delta v_2(A_{\text{ch}})$  slope parameter on kinematics. We then study several main sources of pions in relativistic heavy ion collisions, and find that the competitions among the different  $\pi$  sources can yield another linear  $A_{\text{ch}}$  term due to their multiplicity fluctuations and different  $v_2$  values. This linear  $A_{\text{ch}}$  term does not require any  $A_{\text{ch}}$  dependence in the pion  $v_2$  from each individual source. We discuss the implications of our findings on the experimental search for the CMW.

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