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A novel invariant mass method to isolate resonance backgrounds from the chiral magnetic effect

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The Chiral Magnetic Effect (CME) refers to charge separation along a strong magnetic field, due to topological charge fluctuations in QCD. Charge correlation ($\Delta\gamma$) signals consistent with CME have been first observed almost a decade ago. It has also been known since then that the $\Delta\gamma$ was contaminated by a major background from resonance decays coupled with the elliptic flow (v_2). The invariant mass (m_{inv}) dependence of the $\Delta\gamma$ has, rather surprisingly, not been examined until recently [1].

In this talk, we propose differential $\Delta\gamma$ measurements as function of m_{inv}. By restricting to high m_{inv}, e.g. above 2 GeV/c^2, one may extract resonance-free CME signal where particle transverse momenta are still relatively low (~1.2 GeV/c). In the low m_{inv} region, the backgrounds show resonance peaks and the CME signal is presumably smooth in m_{inv}. These different behaviors can be exploited by a two-component model to extract the CME signal at low m_{inv}. We demonstrate the feasibility and effectiveness of this novel method by using the AMPT and toy-model Monte-Carlo simulations. The power of our method on the upcoming isobaric collisions at RHIC will also be discussed.

[1] J. Zhao, H. Li, F. Wang. Isolating backgrounds from the chiral magnetic effect, arXiv:1705.05410

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