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Electromagnetic field fluctuation and its correlation with the participant plane in Au + Au and isobaric collisions at $\sqrt{s_{NN}} = 200$ GeV

Intense transient electric (**E**) and magnetic (**B**) fields are produced in the high energy heavy-ion collisions. The electromagnetic fields produced in such high-energy heavy-ion collisions are proposed to give rise to a multitude of exciting phenomenon including the Chiral Magnetic Effect. We use a Monte Carlo (MC) Glauber model to calculate the electric and magnetic fields, more specifically their scalar product $\mathbf{E}\cdot\mathbf{B}$, as a function of space-time on an event-by-event basis for the Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV for different centrality classes. We also calculate the same for the isobars Ruthenium and Zirconium at $\sqrt{s_{NN}} = 200$ GeV. In the QED sector $\mathbf{E}\cdot\mathbf{B}$ acts as a source of Chiral Separation Effect, Chiral Magnetic Wave, etc., which are associated phenomena to the Chiral Magnetic Effect. We also study the relationships between the electromagnetic symmetry plane angle defined by $\mathbf{E}\cdot\mathbf{B}$ ($\psi_{E.B}$) and the participant plane angle ψ_P defined from the participating nucleons for the second-fifth order harmonics.

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