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EM field produced in high-energy small collision systems within charge density models of nucleons

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Recent experiments show that \Delta\gamma, an observable designed to detect the chiral magnetic effect (CME), in small collision systems (p+A) is similar to that in heavy ion collisions (A+A). This introduces a challenge to the existence of the CME because it is believed that no azimuthal correlation exists between the orientation of the magnetic field (\phi_B) and participant plane (\phi_2) in small collision systems. In this work, we introduce three charge density models to describe the inner charge distributions of protons and neutrons and calculate the electric and magnetic fields produced in small p+A
collisions at both RHIC and LHC energies. Our results show that the contribution of
the single projectile proton is the main contributor to the magnetic field after averaging over all participants. The azimuthal correlation between \phi_B and \phi_2 is small but not vanished. Additionally, owing to the large fluctuation in field strength, the magnetic-field contribution to \Delta\gamma may be large.

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