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## Effects of magnetic field on the plasma evolution in relativistic heavy ion collisions

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Very strong magnetic fields can arise in noncentral heavyion collisions at ultra relativistic energies, which may not decay quickly in a conducting plasma. We carry out relativistic magnetohydrodynamics (RMHD) simulations to study the effects of this magnetic field on the evolution of the plasma and on resulting flow fluctuations in the ideal RMHD limit. Our results show that magnetic field leads to enhancement in elliptic flow, though in general effects of magnetic field on elliptic flow are very complex. Interestingly, we find that magnetic field in localized regions can temporarily increase in time as evolving plasma energy density fluctuations lead to reorganization of magnetic flux. This can have important effects on chiral magnetic effect. Magnetic field has nontrivial effects on the power spectrum of flow fluctuations. For very strong magnetic field case one sees a pattern of evenodd difference in the power spectrum of flow coefficients arising from reflection symmetry about the magnetic field direction if initial state fluctuations are not dominant. We discuss the situation of nontrivial magnetic field configurations arising from collision of deformed nuclei and show that it can lead to anomalous elliptic flow. Special (crossed bodybody) configurations of deformed nuclei collision can lead to presence of quadrupolar magnetic field which can have very important effects on the rapidity dependence of transverse expansion (similar to beam focusing from quadrupole fields in accelerators). We also show the possibility of the dynamo like effects in the presence of (CFL) superfluid vortex (which may arise in low energy collisions experiments e.g. FAIR and NICA) in our RMHD simulations.

**Primary authors:** SRIVASTAVA, Ajit M. (Institute of Physics, Bhubaneswar, India); DAS, Arpan (Institute of Physics, Bhubaneswar, India); SAUMIA, P.S. (Bogoliubov Laboratory of Theoretical Physics, JINR, Dubna); DAVE, Shreyansh Shankar (Institute of Physics)

**Presenter:** DAVE, Shreyansh Shankar (Institute of Physics)