The 22nd International Conference on
Strangeness in Quark Matter
22-27 March, 2026, Los Angeles, CA

Contribution ID: **208** Type: **Oral Presentation**

Flow of electromagnetic probes as a magnetometer in high-energy heavy-ion collisions

Tuesday, 24 March 2026 10:55 (20 minutes)

We have developed a relativistic resistive magnetohydrodynamic (RRMHD) model to tackle an important problem of heavy-ion physics: understanding the impact of the strong electromagnetic (EM) fields on the quark-gluon plasma (QGP) medium. Our model simulates the evolution and interaction between charges in the QGP and EM fields. This leads to modifications of electrically charged observables. In this presentation, we will report on the initial results of EM probes with corrections from EM fields using an MHD model.

We have calculated the leading order photon and dilepton rates with perturbative corrections from the EM fields. Our RRMHD provides the dynamic fluid and EM field necessary for a complete description of the EM field modifications. Because of the directional dependence of the EM fields produced by the collision spectators, we find significant modifications to the flow of EM probes. Additionally, the modifications depend on the centrality of the collision and event-by-event positions of the initial protons. This suggests EM probes could be used as a magnetometer for high-energy heavy-ion collisions.

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Session Classification: Parallel IV: Chirality, Vorticity and Polarization