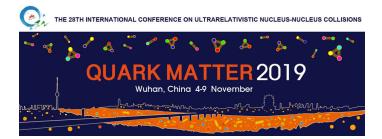
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Magnetic Field in the Charged Subatomic Swirl

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We suggest a novel link between rotation and magnetic field in a charged fluid system: a magnetic field naturally arises along the fluid vorticity direction from the currents associated with the swirling charges. This general connection is demonstrated both for a single particle and for a fluid vortex. Applying the idea for heavy ion collisions we propose it as a new mechanism for generating long-lived in-medium magnetic fields. We estimate the magnitude of this new magnetic field in the AuAu colliding systems across a wide span of collisional beam energy. Such a magnetic field is found to rapidly increase toward lower beam energy and could account for a significant amount of the experimentally observed global polarization difference between hyperons and anti-hyperons. Its time-integrated effect could make considerable contributions to the Chiral Magnetic Effect. Further predictions are discussed and experimental tests are suggested.

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