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Abstract for an Invited Paper
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Strong local parity violation at RHIC[1]

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I will discuss the fate of parity invariance (mirror symmetry) in hot and dense quark-gluon matter. While parity is globally conserved in Quantum ChromoDynamics, the interplay of topology and external magnetic field can induce local parity-odd effects. In particular, the local imbalance between left- and right-handed fermions in the presence of magnetic field induces the spatial separation of positive and negative electric charges ("the Chiral Magnetic Effect"). In heavy ion collisions, this effect can be detected through the separation of positive and negative hadrons with respect to the reaction plane. There is a recent evidence for charge separation from the experiments at Relativistic Heavy Ion Collider. The effect has intriguing implications for the cosmology of the Early Universe, and has analogs in condensed matter physics (quantum wires and graphene), and in astrophysics (particle acceleration in cosmic strings).

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