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Baryon Stopping and Initial Angular Momentum in Heavy Ion Collisions (online)

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Non-central heavy-ion collisions contain large orbital angular momentum ($\sim 10^{3\sim 6}\hbar$) that, at high energies, is expected to induce strong vorticity in the hot bulk fluid and generate global spin polarization of produced particles. As the collision energy $\sqrt{s}$ approaches threshold, the observed global spin polarization should reach a maximum, then drop to zero as increased stopping competes with decreased initial momentum. Recent experimental measurements, however, appear to show a continual rise of hyperon polarization even down to $\sqrt{s} = 2.42$ GeV, suggesting a peak very near threshold and hard to interpret theoretically. Here, we develop a simple Glauber-based initial state model to investigate the initial distribution of angular momentum with respect to rapidity, and the dependence of this distribution on initial baryon stopping across a wide range of collisional beam energy. We estimate that the angular momentum per produced final particle at mid-rapidity peaks around 5 GeV, which presents a potential challenge to an interpretation of the spin polarization measurements near threshold as a consequence due to the initial angular momentum of the colliding system.

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