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Local spin polarization by color-field correlators and momentum anisotropy

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We study the local spin polarization of quarks induced by color-field correlators stemming from the correlation of chromo-Lorentz force and chromo-magnetic polarization or chromo-spin Hall effect in the presence of momentum anisotropy.
Such effects can trigger longitudinal polarization from fluctuating color fields in glasma or quark gluon plasma phases with transverse expansion for relativistic heavy ion collisions. Especially, from the glasma effect, the resulting longitudinal polarization spectrum of $\Lambda/\bar{\Lambda}$ hyperons has a sinusoidal structure with twice the azimuthal angle relative to the anisotropic direction. An order-of-magnitude estimate of the effect aligns with experimental observations. Our findings highlight the significant role of coherent gluon fields as a novel source for spin polarization phenomena in high-energy nuclear collisions.

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