

Spin alignment of vector mesons in heavy-ion collisions

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We present a relativistic spin Boltzmann equation (SBE) for spin dynamics of vector mesons based on Kadanoff-Baym equations. Using SBE and an effective quark-meson model, we calculate ρ_{00} (the 00-element of the spin density matrix) for ϕ mesons formed by the coalescence of s and \bar{s} quarks which are assumed to be polarized by the vorticity and ϕ fields. We show that the contributions to ρ_{00} from the vorticity and ϕ fields all appear as local correlation between strong force fields of the same kinds and same components. This indicates that fluctuations of strong force fields play an important role in ρ_{00} , which can be formulated and extracted in relativistic quantum transport theory. Our results on the colliding energy, transverse momentum and centrality dependence of ρ_{00} are in good agreement with recent STAR data for ϕ mesons.

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