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Quark coalescence model for spin alignments of vector mesons ϕ and K^{*0}

We propose an improved quark coalescence model with spin degrees of freedom for vector mesons by spin density matrix in phase space. This model allows us to estimate spin alignments of vector mesons using polarizations of quarks. We propose that a significant positive deviation from 1/3 of the spin density matrix element ρ_{00} for the ϕ meson may attribute to the electric part of the mean vector ϕ field generated in heavy ion collisions. Meanwhile, a negative deviation of ρ_{00} for the K^{*0} meson may come from the electric part of the vorticity tensor field. The difference between spin alignments of ϕ and K^{*0} is due to the large mass ratio of strange quarks to light quarks. These results should be tested by a detailed and comprehensive simulation of vorticity tensor fields and vector ϕ fields in heavy ion collisions.

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