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Evolution of the rho meson's spin alignment in a pion gas

We study the evolution of the spin alignment of neutral ρ mesons in a pion gas using spin kinetic or Boltzmann equations. The $\rho\pi\pi$ coupling is given by the chiral effective theory. The collision terms at the leading and next-to-leading order in spin Boltzmann equations are derived. The evolution of the spin density matrix of the neutral ρ meson is simulated with different initial conditions. The numerical results show that the interaction of pions and neutral ρ mesons creates very small spin alignment in the central rapidity region if there is no ρ meson in the system at the initial time. Such a small spin alignment in the central rapidity region will decay rapidly toward zero in later time. If there are ρ mesons with a sizable spin alignment at the initial time the spin alignment will also decrease rapidly. We studied the effect on ρ_{00} from the elliptic flow of pions in the blast wave model. With vanishing spin alignment at the initial time, the deviation of ρ_{00} from 1/3 is positive but very small.The effect of tensor polarizations of ρ mesons on γ correlator observables for CME has also been investigated.

Category

Theory

Collaboration (if applicable)

Primary author: YIN, Yi-Liang

Co-authors: PANG, Jin-yi (University of Science and Technology of China); Prof. WANG, Qun (University of Science and Technology of China); Dr PU, Shi (University of Science and Technology of China); DONG, Wenbo (University of Science and Technology of China)

Presenter: YIN, Yi-Liang

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