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Spin alignment of vector mesons in a rotating medium ⋮ a NJL model study

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Vorticities in heavy-ion collisions (HIC) are supposed to induce spin alignment and polarization phenomena of quarks and mesons. In this paper, we consider a uniformly rotating medium in which quark and anti-quark pairing are suppressed. Consequently, in the framework of Nambu-Jona-Lasinio (NJL) model, dynamical quark masses are descending as the angular velocities grow. In case of vector mesons, mass splitting will emerge among three different spin component $s_z = 0, \pm 1$ along the axis of rotation (z-axis). Furthermore, in a thermal equilibrium system, the difference of mass spectra among $\phi_{s_z=0,\pm 1}$ will cause that vector meson with $s_z = +1$ will be preferred in a rotating medium. Correspondingly, ϕ mesons will be less possible to occupy the $s_z = 0$ state which leads to spin alignment $\rho_{00} < \frac{1}{3}$.

Theory / experiment

Theory

Group or collaboration name

Primary authors: HUANG, Mei; WEI, Minghua (Fudan University)

Presenter: WEI, Minghua (Fudan University)

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