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Diffusion coefficients of D-meson in rotating Hadron gas

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In off-central heavy ion collisions (HIC), the initial orbital angular momentum (OAM) of the colliding heavy nuclei can be transferred to the participants and subsequently to the nuclear medium formed. This finite OAM can lead the system to rotate with some finite angular velocity. The transport properties, like electrical conductivity, viscosities, thermal conductivity, heavy meson diffusion, etc, of the rotating nuclear medium are generally modified with respect to their non-rotating counterparts. The diffusion coefficients of heavy mesons and the corresponding nuclear suppression factor RAA are useful probes to understand the nature of the medium formed in the HIC experiments. In this work, we have determined the anisotropic spatial diffusion coefficients of D-meson diffusing under the background of rotating hadronic gas. To calculate the diffusion coefficients, we have set up a covariant Boltzmann transport equation in the rotating frame using the relaxation time approximation. The background hadron gas has been modeled by the popular hadron resonance gas model (HRG). The relaxation time is determined by assuming a hard-sphere-type scattering model of the D-meson with the HRG. The range for the scattering length "a"of the D-meson-HRG interaction is obtained by varying "a"to cover the results of the existing model calculation of the parallel component of diffusion. After calibrating the scattering length, we obtain the variation of the perpendicular and hall diffusion coefficients both with respect to temperature and angular velocity.

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