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The rho meson in hot hadronic matter and low mass dilepton spectra

Content :

The structure of the one loop self-energy graphs of the rho meson is analyzed in the real time formulation of thermal field theory and interaction vertices from chiral perturbation theory which is the low energy effective theory of QCD. The discontinuities of these graphs across the various branch cuts are evaluated. These contributions are identified with the different sources of medium modifications providing a unified description of such processes discussed in the literature. An exhaustive set of mesonic and baryonic self energy graphs up to mass 2 GeV and spin 3/2 is considered in the calculation of the imaginary and real parts of the self energy. The spectral function of the rho meson in hot and dense matter, evaluated for finite values of the three momentum of the rho, is seen to provide a large enhancement of lepton pair production below the bare peak of the rho. The sensitivity of the effective temperature obtained from the slopes of transverse momentum spectra of dileptons to the medium effects is demonstrated at RHIC and LHC energies.

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