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Spectral function for over-occupied gluodynamics from real-time lattice simulations

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We study the spectral properties of a highly occupied non-Abelian non-equilibrium plasma that is expected to be created during the initial stages of heavy-ion collisions in the weak-coupling description of the collisions. The spectral function of this far-from-equilibrium plasma is measured by employing linear response theory in classical-statistical real-time lattice Yang-Mills simulations. We establish the existence of transversely and longitudinally polarized quasi-particles and obtain their dispersion relations, effective mass, plasmon frequency, damping rate and further structures in the spectral and statistical functions. Our results are consistent with hard thermal loop (HTL) effective theory but also indicate effects surpassing its leading order. The method can be employed beyond the range of validity of HTL.

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