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Heavy quark diffusion in an overoccupied gluon plasma

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We extract the heavy-quark diffusion coefficient κ and the resulting momentum broadening $\langle p^2 \rangle$ in an overoccupied gluon plasma. We find several features in the time dependence of the momentum broadening: a short initial rapid growth of $\langle p^2 \rangle$ followed by linear growth in time due to Langevin-type dynamics and damped oscillations around this growth at the plasmon frequency. We show that these oscillations arise from an excess of gluons in the infrared and are therefore a gauge invariant confirmation of the infrared enhancement we have previously observed in gauge-fixed correlation functions. We argue that the kinetic theory description becomes less reliable in the presence of this IR enhancement.

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