

Nonlinear Phase Mixing in the Einstein-Vlasov System near Schwarzschild Spacetime

Sachoon Eo

We discuss the dynamics of the spherically symmetric Einstein-Vlasov system near Schwarzschild spacetime, for perturbations supported on trapped geodesics, and hence the characteristics of the Vlasov equation remain bounded. In this regime the matter does not disperse - the main new difficulty - and one can only hope for decay of time derivatives. Via nonlinear phase mixing in dynamical action-angle variables, we prove polynomial decay of the time derivatives of the energy-momentum tensor and the metric coefficients on a long time interval. The key ingredients are the choice of gauge, an ODE formulation of the Einstein equations, and the monotonicity of the period function.