Reply to referee report 2

We thank the referee for their positive comments about the novelty and relevance of our work. Below we note the changes we have made is response to the refereeâs comments.

The referee writes:

1. In the case of heat dissipation of a metal with a well-defined Lindhard continuum, it is important to keep in mind that in general for 3d metals, almost all of the spectral weight in the Lindhard continuum goes into the plasmon once the long-range Coulomb interaction is included. The Lindhard continuum remains but with very low spectral weight. This is likely to affect estimates such as (21).

Our response:

This is an important point that we should have commented upon. We have added the following text in footnote 3, around equation (17): "The unscreened charge dynamics must be used to compute the energy relaxation rate into phonons. The effects of screening by Coulomb interactions have already been incorporated into the electron-phonon interaction — indeed, screening is essential in order to obtain a short range electron-phonon interaction in the first place. The electron-phonon interaction therefore expresses the coupling of the electrons to the total electric field created by lattice vibrations, including screening. The electronic response to the total electric field is then given by the unscreened Green's function, see e.g. §7.4.2 of [22]."

The referee writes:

2. The authors discuss the charge susceptibility of the Hubbard model as reported in Refs 29 and 30 and note its compatibility with (25). While the comparison is not unreasonable, it should be noted that the spectra calculated in 29 and 30 were obtained via analytic continuation, and details such as whether the lineshape is asymmetric are difficult to extract from imaginary time data. Another reference is Phys. Rev. B 92, 195108 (unfortunately this reference also relies on analytic continuation).

Our response:

We agree with this point. We have added a sentence in the paragraph below Fig. 7 noting that the analytic continuation in those references means that the line shapes should not be taken too literally. We had also added a reference to the paper mentioned by the referee, it is the new reference [29].

The referee writes:

3. For clarity, the authors should define n_k which first appears in (10). As I understand, the implied definition is $n_k = \sum_r e^{-ikr} c_r^\dagger c_r$. Often in literature, n_k is used for the fermion occupation i.e. $n_k = c_k^\dagger c_k$, which is a different quantity.

Our response:

We have added a definition of n_k immediately below equation (10).