**EM Susceptibilities**

Don’t know. So I’ll presume it’s as before, from the Thomas Fermi or Linhardt approximation. One would think that, as localization sets in, it would take on a more insulator like form, perhaps with resonant frequencies? Dunno.

Would also tend to think that the diamagnetic response would be supressed since the electrons can’t form a large current, and so the metal would be unequivocally paramagnetic?



Well I think this can be further substantiated by looking at the conductivity calculation in the non-equilibrium properties folder. There, we implicitly presumed a spin-independent electromagnetic perturbation (since we didn’t have it coupling to the spins per se´, which would definitely be the case apropos electric fields). And we found the current density to be related to the vector potential via:



And we said the conductivity tensor was:



so that we could say



Well we can already see that in the ω → 0 limit, since remains finite and **A** is proportional to **B**, the induced current would go to zero, and with it, the magnetization **M** = -(1/2)∫dτ(**r**×**J**). So as long as there is finite resistance, we get no steady-state diamagnetic response really.