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Bad metallic transport from fluctuating density waves[1] BLAISE GOUTERAUX, NORDITA, LUCA DELACRETAZ, SEAN HARTNOLL, ANNA KARLSSON, Stanford University — In many bad metals the Drude peak moves away from zero frequency as the resistivity becomes large at increasing temperatures. Bad metals likely have no long-lived quasiparticles and their late-time physics is thereby described by hydrodynamics. Within hydrodynamics a Drude peak is broadened by momentum relaxation, but can only move away from zero frequency if translations are spontaneously broken. We suggest that the hydrodynamics of density wave states is therefore the correct kinematic framework for discussing these materials. We show that the resistivity of general, non-Galilean invariant, density wave states is determined by universal diffusive processes that are independent of the rate of momentum relaxation and strength of pinning due to e.g. weak disorder. Weakly disordered, fluctuating density wave states can have large, finite resistivities. Fitting to available optical conductivity data for bad metals reveals that the energy scales controlling the dynamics are linear in temperature. The T-linearity of the resistivity follows from this observation.

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