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Heat diffusion in the disordered Fermi and electron liquids: the role of inelastic processes[1] GEORG SCHWIETE, Johannes Gutenberg University Mainz, ALEXANDER FINKEL'STEIN, Texas A&M University — We study thermal transport in the disordered Fermi and electron liquids at low temperatures. Gravitational potentials are used as sources for finding the heat density and its correlation function. For a comprehensive study, we extend the renormalization group (RG) analysis developed for electric transport by including the gravitational potentials into the RG scheme. The analysis reveals that for the disordered Fermi liquid the Wiedemann-Franz law remains valid even in the presence of quantum corrections caused by the interplay of diffusion modes and the electron-electron interaction. In the present scheme this fundamental relation is closely connected with a fixed point in the multi-parametric RG flow of the gravitational potentials. For the disordered electron liquid we additionally analyze inelastic processes induced by the Coulomb interaction at sub-temperature energies. While the general form of the correlation function has to be compatible with energy conservation, these inelastic processes are at the origin of logarithmic corrections violating the Wiedemann-Franz law. The interplay of various terms in the heat density-heat density correlation function therefore differs from that for densities of other conserved quantities, such as total number of particles or spin.

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Georg Schwiete
Johannes Gutenberg University Mainz

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