Light emission in delta-T-driven mesoscopic conductors

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The scattering picture of electron transport in mesoscopic conductors shows that fluctuations of the current reveal additional information on the scattering mechanism not available through the conductance alone. The electronic fluctuations are coupled to the electromagnetic field and a junction at finite bias or temperature will emit radiation. The nonsymmetrized current-current correlators characterize the emission and absorption spectrum. Recent interest is focused on the so-called delta-T noise, which is the nonequilibrium noise caused by a temperature difference between the terminals. Here, we generalize the notion of delta-T noise to the nonsymmetrized current-current correlator at finite frequencies. We investigate the spectral density for energy- independent scattering and for a resonant level as an example of energy-dependent scattering. We find that a temperature difference ΔT leads to a partial reduction of the noise for certain frequency ranges. This is a consequence of temperature broadening in combination with a frequency shift of the involved Fermi distributions. In the case of energy-independent scattering, the lowest order is a quadratic $\propto (\Delta T)2$ correction of the thermal-like noise spectrum. For the resonance, additional contributions to the delta-T noise spectrum arise that are $\propto \Delta T$ to the lowest order.

References:

[1] M. Hübler, W. Belzig, *arXiv* preprint arXiv:2210.04984 (2022).