

Non-local Dynamics

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Adding gradient terms to thermodynamic quantities has long been a means to incorporate finite-range interactions into descriptions of equilibrated physics. Here, we show how gradient terms can be incorporated into hydrodynamic treatments, thus making it possible to dynamically model the growth of fluctuations and correlations of charge, energy and momentum in a consistent fashion for any hydrodynamic evolution. A single parameter, along with constraints from Kubo relations, then determines all the behavior. Sample calculations will be presented for simple systems, with the immediate goal of understanding the degree to which novel features of the phase diagram can manifest themselves in final-state measurements.

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