Denoising and Extension of Real- and Imaginary-time Green's Functions

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Response functions of quantum systems, such as electron Green's functions, magnetic, or charge susceptibilities, describe the response of a system to an external perturbation. They are the central objects of interest in field theories and quantum computing and measured directly in experiment. Response functions are intrinsically causal. In equilibrium and steady-state systems, they correspond to a positive spectral function in the frequency domain. Response functions define an inner product on a Hilbert space and thereby induce a positive definite function. The properties of this function can be used to reduce noise in measured data and, in equilibrium and steady state, to construct positive definite extensions for data known on finite time intervals, which are then guaranteed to correspond to positive spectra.