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Stochastic quantum thermodynamics of clocks.

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The precision of a quantum clock near zero temperature, depends on how it is driven and how it is measured. We investigate both limits to precision using quantum stochastic thermodynamics, and illustrate the results with examples (superconducting and nano mechanical). Of particular relevance is the nature of the measurement as the clock signal ultimately depends on estimating the fluctuations in the period extracted from the measurement signal. We describe precision in terms of a kinetic uncertainty relation, a recently developed method to bound parameter estimation in continuously measured quantum systems.

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