Nonlinear Coherent Heat Machines and Closed-System Thermodynamics

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All existing heat machines are dissipative open systems. Hence, they cannot operate fully coherently. We propose to replace this conventional thermodynamic paradigm by a completely different one, whereby heat machines are nonlinear coherent closed systems comprised of few field modes. Their thermal-state input is transformed by nonlinear interactions into non-thermal output with controlled quantum fluctuations and the capacity to deliver work in a chosen mode. This new paradigm allows the bridging of quantum coherent and thermodynamic descriptions.