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Quantum Feynman Ratchet KETAN GOYAL, RYOICHI KAWAI, Univ of Alabama - Birmingham — As nanotechnology advances, understanding of the thermodynamic properties of small systems becomes increasingly important. Such systems are found throughout physics, biology, and chemistry manifesting striking properties that are a direct result of their small dimensions where fluctuations become predominant. The standard theory of thermodynamics for macroscopic systems is powerless for such ever fluctuating systems. Furthermore, as small systems are inherently quantum mechanical, influence of quantum effects such as discreteness and quantum entanglement on their thermodynamic properties is of great interest. In particular, the quantum fluctuations due to quantum uncertainty principles may play a significant role. In this talk, we investigate thermodynamic properties of an autonomous quantum heat engine, resembling a quantum version of the Feynman Ratchet, in non-equilibrium condition based on the theory of open quantum systems. The heat engine consists of multiple subsystems individually contacted to different thermal environments.

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