**Abstract**

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|  | Quantum thermodynamics has opened a new world for us. It aims studying laws of thermodynamics in the quantum world. The study of open quantum systems is another benchmark that is being set in recent times. As we are inching towards making efficient quantum thermal machines, we have to encounter the problems that become dominant in quantum domain. Shortening the duration of a process leads to more power generation in the process and that introduces irreversibility in the evolution of the system. Our main interest in this thesis is to study the e↵ects of quantum coherence in fast driving protocols, especially dividing the irreversible en tropy production into two di↵erent components, coherent and non-coherent, and to study the coherent contribution in detail for di↵erent kind of driving Hamiltonians. In recent years, it has been found that the relative entropy of coherence is a useful measure of the amount of coherence generated in a system. In this thesis, we have measured relative entropy of coherence for di↵erent driving potential and studies its time dependence. |