# Rebuilding quantum thermodynamics on quantum measurement

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Thermodynamics relies on randomness. In classical thermodynamics, the coupling to a thermal bath induces stochastic fluctuations on the system considered: Thermodynamic irreversibility stems from such fluctuations [1], which also provide the fuel of thermal engines. Quantum theory has revealed the existence of an ultimate source of randomness: Quantum measurement through the well-known measurement postulate [2]. In this talk I will present recent attempts to rebuild quantum thermodynamics on quantum measurement, from quantum irreversibility to quantum engines extracting work from quantum fluctuations [3,4].

[1] A. Auffèves, Viewpoint : Nuclear spin points out the arrow of time, Physics 8, 106 (2015)

[2] A. Auffèves, P. Grangier, Recovering the quantum formalism from physically realist axioms, Scientific Reports 43365 (2017)

[3] C. Elouard, D. Herrera-Marti, M. Clusel, A. Auffèves, The role of quantum measurement in stochastic thermodynamics, Nature Quantum Information, 10.1038/s41534-017-0008-4 (2017)

[4] C. Elouard, D. Herrera-Marti, B. Huard, A. Auffèves, Extracting work from quantum measurement in Maxwell's demon engines, arXiv:1702.01917, accepted in Physical Review Letters