



CEA – Saclay, 91191 Gif-sur-Yvette Cedex  
Service de Physique de l'Etat Condensé - UMR 3680

## SÉMINAIRE

Mercredi 18 avril 2018 à 11h15

**Orme des Merisiers SPEC, Salle Itzykson, Bât.774**

**Gatien VERLEY**

*Laboratoire de Physique Théorique Orsay, UMR 8627, Université Paris Sud*

### **A stochastic thermodynamics perspective on machines**

Mesoscopic machines (like molecular motors) can be modeled by Markov processes whenever a fluctuating environment strongly influences their behavior. In this context, stochastic thermodynamics is the appropriated theoretical framework to study the machine output power and efficiency, either at the mean or fluctuating levels. In this talk, I will review the main results of stochastic thermodynamics and their consequences for machines. The second law, that takes here the shape of the so-called fluctuation theorem, constrains in many ways the behavior of a machine. For systems working in a non equilibrium stationary state, I will introduce the notion of non-equilibrium conductance matrix connecting currents and thermodynamic forces. This matrix is essential to determine

(i) the tight coupling function (connected to the figure of merit),  
(II) the maximum achievable efficiency in term of the reversible efficiency and the tight coupling function only.

These concepts offer a general point of view on recent results on power-efficiency trade-off that limits a machine performance

*A coffee break will be served at 11h00.*

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