

CEA - Saclay 91191 Gif-sur-yvette Cedex  
Service de Physique de l'Etat Condensé  
**SÉMINAIRE**

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**Mercredi 26 janvier 11h15**

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

**Increasing thermoelectric efficiency: Dynamical models unveil  
microscopic mechanisms**

**G. Benenti**

Center for Nonlinear and Complex systems,

Univ. Insubria, Como, Italy

Understanding from first principles and nonlinear dynamics simulations the microscopic mechanisms that can be implemented to control heat and charge flows might prove useful in engineering new thermoelectric devices with high thermoelectric efficiency. The main focus will be on the physical mechanisms, unveiled by dynamical models, which lead to high thermoelectric efficiency approaching the Carnot limit and to high efficiency at maximum power. In particular, I will discuss the coupled particle and energy transport in a prototype model of interacting one-dimensional system: the disordered hard-point gas, for which numerical data suggest that the thermoelectric figure of merit  $ZT$  diverges with the system size. I will also discuss general thermodynamics bounds on maximum efficiency and efficiency at maximum power for systems with broken time-reversal symmetry.

[1] K. Saito, G. Benenti and G. Casati, "A microscopic mechanism for increasing thermoelectric efficiency", *Chem. Phys.* **375**, 508 (2010).

[2] G. Benenti and G. Casati, "Increasing thermoelectric efficiency: dynamical models unveil microscopic mechanisms", *Phil. Trans. R. Soc. A* **369**, 466 (2011).

A coffee break will be served at 11h00. The seminar will be given in English.

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Contact : [patrice.bertet@cea.fr](mailto:patrice.bertet@cea.fr)/[elisabeth.bouchaud@cea.fr](mailto:elisabeth.bouchaud@cea.fr) - Tel : +33 1 69 08 55 29 / 41 03  
<http://iramis.cea.fr/spec/>