

COST MP 1209

Report by invited speakers

Profs. A. Imparato and C. Van den Broeck

The Many Faces of Computation.

Workshop University of California at San Diego

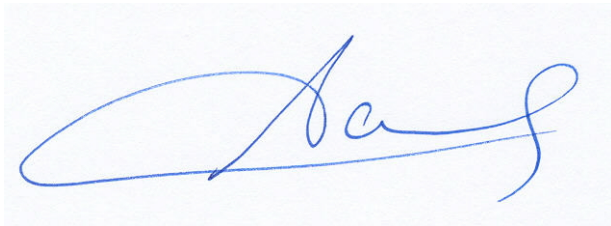
La Jolla, USA

July 13-16 2014

This workshop forms part of a series of smaller meetings organized yearly at the university of California at San Diego. The purpose was to explore the wider meaning of computation by bringing together experts from very diverse background, including nonlinear dynamics, neural networks, gene-regulation, computational neuroscience, computational complexity, machine learning, quantum computation and thermodynamics of computation. The workshop was an excellent occasion to address issues and exchange expertise that are relevant to the MP1209 COST program. Prof. Alberto Imparato gave a talk on the “Efficiency at maximum power in molecular motors”, and Prof. C. Van den Broeck on “A short introduction to large deviations”. We both had discussions and exchanges with other speakers and participants, and in particular on issues related to the MP1209 COST program. Prof. Alberto Imparato had discussions with Michael Gibson on the conformational changes occurring in microscopic motors, and their effect on the system thermodynamics. Furthermore he had discussions with several participants in the meeting on the thermodynamics of coupled motors, in particular with Prof. Lindenberg. Prof. Christian Van den Broeck had discussions with Tristan Webb about the advantage of higher level computer languages, with Michael Gibson and Raul Toral about utilizing algorithms from statistical mechanics for evaluating rare events, with Daniel Escaff about the relevance of synchronization in learning, with Emre Neftci about the hardware implementation of deep learning. As achievements, we mention:

- 1) C. Van den Broeck has started a collaboration with Prof. R. Toral, who happened to be one of the speakers at the meeting and with whom a COST exchange visit will take place in September. A paper with COST MP 1209 acknowledgment is in preparation.
- 2) A. Imparato has established scientific contacts with faculty members of the UCSD, with a view to future scientific collaborations. In particular, he has advertised the COST action MP1209 amongst the participants, discussing the main projects and goals of the action, and the possibility of support for scientific collaborations.

- 3) The connections established at the workshop open the possibility of a collaboration between COST MP1209 and the "MURI » project at UCSD (being a 7 million\$ 5 year grant from the U.S. Department of Defense, investigating the dynamic principles of collective brain activity, led by Prof. H. Abarbanel with Prof. K. Lindenberg as co-investigator).



Christian Van den Broeck

Diepenbeek September 04 2014

Alberto Imparato

Aarhus, September 5, 2014

