Uprzejmie zawiadamiamy, że w ŚRODĘ
20 maja 2015 r., o godz. 10:00
w sali 203 (bud. 1) odbędzie się seminarium, na który

Dr Olli-Pentti Saira

Low Temperature Laboratory, Aalto University, Finland

wyglosi referat na temat:

„Thermal fluctuations in small metallic systems”

I will present experimental work illuminating the unique thermal phenomena
which occur in nanostructures at millikelvin temperatures. A combination of energy-sensitive
electronic transport, minuscule heat capacities and strongly material and temperature-
dependent heat conductivity enables new device concepts for thermometers, calorimeters
and electronic refrigeration [1]. The experiments I will describe in detail also make use of the
NIS tunnel junction and the clean NS interface (N - normal, S - superconducting) as electro-
thermal circuit elements.

In Ref. [2], we measured the distribution of dissipated energy as individual electrons
are shuffled between the electrodes of a single-electron box. This distribution becomes
increasingly non-Gaussian for higher driving frequencies. Furthermore, with a finite
probability the amount of dissipated heat is negative, illustrating statistical violations
of the Second Law. We show that the experimental distributions are consistent with non-
equilibrium fluctuation relations [3,4] that can be considered generalizations of the Second
Law for small systems.

I will also describe our on-going efforts aimed at observing temperature fluctuations
in a small piece of copper. As noted by Landau and Lifshitz [5] among others, the
temperature of a small body will undergo equilibrium fluctuations with an r.m.s. amplitude
that depends only on its temperature and heat capacity. These fluctuations set a
fundamental limit on the energy resolution of calorimeters, although they can be easily
overwhelmed by other noise sources. Recently, we have demonstrated a high-bandwidth
cross-correlation measurement of tunnel junction thermometers that should allow for the
measurement of the temperature fluctuation spectrum.


Serdecznie zapraszamy

Roman Puźniak
Henryk Szymczak
Andrzej Wiśniewski