

Seminar on Condensed Matter Theory

Group of Theoretical Physics at the Department of Condensed Matter Physics
of Charles University has a pleasure to invite you to attend the seminar

on 22 November 2018 at 13:00

at Faculty of Mathematics and Physics of Charles University, Ke Karlovu 5, 121 16 Praha 2

Seminar room F052



dr inż. Katarzyna Roszak

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Towards the study of nonequilibrium heat capacity in the quantum regime

working version

We are studying a system composed of two metallic leads interacting with a single level quantum dot and we assume that the tunnel couplings between the leads and the dot are time dependent. The thermomechanical field method and an appropriate choice of this time-dependence allows for the description of transport through the quantum dot in the situation, when it is the temperature of the leads which is time-dependent [1]. The calculation of the heat current, in turn, allows us to find the heat capacity in the nonequilibrium case, when electrons tunnel from one lead to the other. We compare the results in the limit of vanishing line-widths with the classical nonequilibrium heat capacity [2], to verify the applicability of the method used. The goal of this study is to establish, if the negative values of the heat capacity, which were theoretically predicted in classical, nonequilibrium transport scenarios at very low temperatures [2] are confirmed by results obtained in analogous scenarios in the quantum regime.

[1] Masahiro Hasegawa and Takeo Kato, "Temperature-driven and electrochemical-potential-driven adiabatic pumping via a quantum dot," *Journal of the Physical Society of Japan* 86, 024710 (2017).

[2] Jiří Pešek, Eliran Boksenbojm, Karel Netočný, "Model study on steady heat capacity in driven stochastic systems", *Central European Journal of Physics* 10(3), 692-701 (2012).

