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MAGNETIC NON-EQUILIBRIUM CONTROL OF HEAT AND CHARGE TRANSPORT IN PARAMAGNETIC MOLECULAR DIMER

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Utilizing the possibility to electrically and thermally control the magnetic exchange, interactions between localized magnetic moments, we here present results regarding the charge and heat transport properties in dimer comparing, for example, paramagnetic molecules. We consider both charge and heat, transport under non-equilibrium conditions imposed using voltage bias and temperature difference across the junction. Generic properties for both transport quantities are reduced currents in the magnetically active regime compared to the inactive, or, paramagnetic, and efficient current blockade in the anti-ferromagnetic regime. In contrast, while the charge current is about an order of magnitude larger in the ferromagnetic regime, compared to the anti-ferromagnetic, the heat current is efficiently blockaded there as well. This disparate behavior of the heat current is attributed to current resonances in the ferromagnetic regime which counteract the normal heat flow. It can also be noted that the temperature difference has a strongly reducing effect of the exchange interaction, which tends to destroy the magnetic control of the transport proper-ties. The upside of the weakened exchange interaction is a possibility to tune the system into thermal rectification, for both the charge and heat currents.

BIOGRAPHY

Jonas Fransson has completed his PhD in Physics in 2002, at Uppsala University, Uppsala, Sweden, and postdoctoral studies from The Royal Institute of Technology, Stockholm, Sweden, and Los Alamos Natl. Lab., Los Alamos, NM, USA. He is Professor in Physics at Uppsala University since 2015. He has published more than 80 papers in reputed journals and written the text book "Non-Equilibrium Nano-Physics".

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