MAGNONS COHERENT TRANSMISSION AND HEAT TRANSPORT AT MAGNETIC NANO JUNCTIONS

A. Khater[a], B. Bourahla[b], and M. Abou Ghantous[c]

[a] Laboratoire de Physique de l'Etat Condensé UMR 6087, Université du Maine, 72085 Le Mans, France

[b] Laboratoire de Physique et Chimie Quantique, Université de Tizi Ouzou, 15000, Algérie

[c] Science Program, Texas A and M University at Qatar, Education City, PO Box 23874, Doha, Qatar

9.7 cm

A general model calculation is presented for the magnons coherent transmission, and corresponding heat transport, at insulating magnetic nano junctions. The system consists of a magnetic insulating nano junction between two magnetic leads which may be treated as insulating. A Heisenberg Hamiltonian describes the magnetic order for the system. Spin dynamics is analyzed using the equations of motion for the spin precession displacements on the lattice sites, valid for the range of temperatures of interest. The coherent transmission and backscattering probabilities at a given nano junction are calculated using the matching theory, for all magnon frequencies in the lead bands and arbitrary angles of incidence, at variable temperature, and for different nano junction thicknesses. The model yields the heat transport due to the coherent transmission of magnons between the leads when maintained at slightly different temperatures. This model calculation elucidates in particular the dependence of the coherent transmission of magnons and their heat transport per magnon branch for variable nano junction thicknesses and their associated magnetic order. It is applied in particular to the Fe/Gd/Fe system with a sandwiched ferromagnetic Gd junction of varying thickness.

13.4 cm

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Corresponding author :

A. Khater

Address for correspondence :

Laboratory for Condensed Matter Physics UMR 6087
Faculty of Science
University of Maine
Av. Olivier Messiaen
72085 Le Mans, France

Email address :

antoine.khater@univ-lemans.fr