ELECTRONIC TRANSPORT AND MAGNETISM IN ATOMIC-SIZED STRUCTURES

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Different techniques such as the Scanning tunnelling microscope, the mechanically controlled break junctions, electrochemical methods, or several others, make it possible to control the formation of atomic-sized structures connected to macroscopic electrodes. In this way the ultimate structures: atomic-contact, atomic wire or molecular bridge, have been achieved.

In the last decade there has been a great success in measuring the properties of the electronic transport over these structures [1]. There, the conductance (G) is described by the Landauer's formulae: $G = G0 \Sigma Ti$ where G0=2e2/h the conductance quanta, Ti is the transmission of the ith channel and the summation goes over all the conduction channels available for the structure. For the case of magnetic materials, the spin degeneracy is removed and then we should distinguish channels for the different spins, each of these with conduction up to G0/2.

Several attempts have been made in order to measure signatures of these fractional quanta of conductance, although we can show that for most of the cases this is not straight forward and contamination can give misleading results [2]. Finally we will show new approaches to obtain information of magnetism using transport properties in atomic contacts of magnetic materials that can help in the areas of spintronics and molecular electronics[3]..

References:

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