The Hebrew University of Jerusalem , Physics Colloquium

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"Kondo effects in quantum point contacts"

Quantum point contacts (QPCs) are the basic building blocks of any nano-electronic structure, and display quantized conductance, reflecting the quantization of the number of transparent channels. An additional feature, coined the "0.7 anomaly", has been observed in almost all QPCs, and has been a subject of intensive debate in the last couple of decades. I will demonstrate that this feature can be attributed to the emergence of a quasi-localized state at the QPC, which explains all the phenomenology of the effect. I will describe the theory behind a new experiment which measured the conductance through length-tunable QPC. The experimental findings support the picture of the localized state(s). Interestingly, with increasing QPC length, it was found that both the 0.7 anomaly and the zero bias peak in the differential conductance oscillate and periodically split with channel length, supporting the idea that the number of the localized states increases with length, leading to an alternating Kondo effect.

Work with: H. Bary-Soroker, O. Entin-Wohlman and A. Aharony, Phys. Rev. Lett. 110, 056801 (2013).