

Motivation

We study carrier interactions in semiconductor quantum dot systems. An indirect spin interaction between remote quantum dots mediated by conduction electrons is known as RKKY interaction, which may be utilized to fabricate new spin devices.

Originality

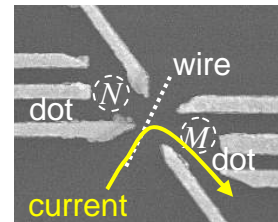
Anti-ferromagnetic spin exchange interaction between a quantum dot and conduction electrons give rise to the Kondo effect at low temperature. We found that the Kondo effect in one dot is non-locally switched on/off by the other quantum dot mediated by conduction electrons in the quantum wire between the two dots.

Impact

RKKY interaction can realize both ferromagnetic and anti-ferromagnetic spin interactions between remote quantum dots, which is useful for spintronics and quantum information processing.

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Device structure



The Kondo effect in the right quantum dot is non-locally switched off only when the left quantum dot carries spin. RKKY interaction is considered as a possible mechanism behind this.

