

## RKKY interaction in coupled quantum dots

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In electronic devices based on quantum dots the control of single, localized spins is of technological importance. From the physical point of view quantum dot can be assumed as an artificial magnetic impurity. Localized moment of quantum dot can interact with the adjacent one by exchanging electrons that are transmitted either by the metallic substrate or by metallic lead. As the result of that there arises effective magnetic interaction between spins of quantum dots that displays RKKY features [1]. We show that due boundary conditions imposed onto electron mobility their spectrum changes and the density of electron states shows fractional spectral dimension. In our contribution we study specific features of the RKKY interaction between quantum dots basing on the idea of fractional spectral dimensionality [2]. We prove that RKKY range function of interacting quantum dots interpolates between the 2D and 3D cases in the case of substrate mediated interaction. Furthermore, we show that in the chain geometry, when interaction is mediated *via* electrons of a quantum wire that joins quantum dots the the spectral dimension that determines RKKY interaction can exceed 3.

[1] P. Simon, R. Lopez, Y. Oreg: Phys. Rev. Lett. **94**, 086602 (2005).

[2] Z. Bak, R. Jaroszewicz, W. Gruhn: J. Mag. Mag. Mater. **213**, 340 (2000).

13.4 cm

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9.7 cm