Electronically addressed Rabi oscillations

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Here we present a theoretical analysis of quantum coherent transport through a T-shaped double quantum dot system in the presence of monochromatic and stationary light. The considered device is composed of one-level dot (the channel) connected to two metallic electrodes (source and drain are treated within the wide-band approximation) and weakly coupled to another two-level dot (the scatterer with one singly occupied level – paramagnetic trap). It was shown that the Rabi oscillations of the scatterer are reflected in the time-dependent oscillations of the current flowing through the system for a fixed bias voltage [1, 2].

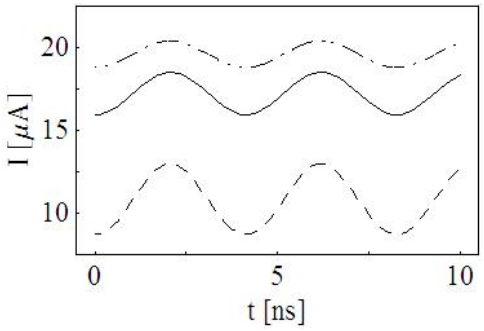

Fig. 1. Electrical current *versus* time for three values of fixed voltages (the upper curve, the higher voltage).

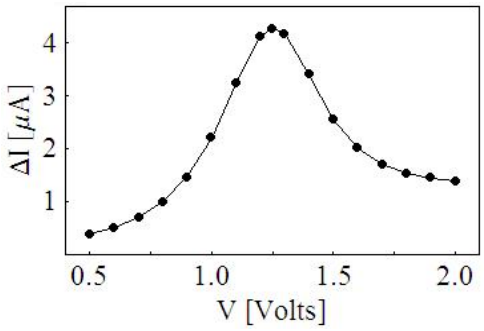

Fig. 2. Amplitude of the Rabi oscillations as a function of bias voltage.

Calculations are performed within an adiabatic approximation, while the conditions needed to observe Rabi oscillations are discussed. The essential question of the amplitude of the Rabi oscillations is analyzed in detail in three aspects: the detuning parameter, the value of the fixed bias voltage, and the strength of the coupling between two dots.

[1] E.H.L. Koppens *et al.*, Nature **442** (2006) 766
[2] W. Harneit *et al.*, cond-mat/0702604 (2007)

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