# Interplay of dark states and superconducting correlations in transport through quantum dot trimers

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The electronic transport through a hybrid triple quantum dot system is theoretically studied by means of the real-time diagrammatic technique. The central part of the system is arranged in a triangular geometry, with two quantum dots weakly coupled to metallic electrodes, while the third dot is proximitized by the s-wave superconductor. In particular, the focus is put on the regime where one- and two-electron dark states are formed due to the destructive interference of the electronic wavefunction. This effect greatly influences the transport through the system, leading to the current blockade, enhanced shot-noise and coherent population trapping. It is shown that the presence of the superconducting pairing correlations in the system leads to lifting of the dark state blockade and significantly reduces the shot-noise.
Moreover, the current oscillations due to the magnetic flux enclosed by the triangular structure and the influence of superconducting correlations are considered. It is predicted that for one-electron dark state the oscillations are strongly diminished while the current blockade is lifted, however when the system is in two-electron dark state regime, the oscillations of current suppression are conserved, yet for the doubled period of applied magnetic flux.

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