INTERPLAY OF SPIN AND CHARGE IN QUANTUM DOTS: THE EFFECT OF DISORDER

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The inclusion of charging and spin-exchange interactions (of continuous symmetry) within the Universal Hamiltonian description of quantum dots is challenging as it leads to a non-Abelian action. This is in sharp contrast to Ising-like spin exchange which leads to an Abelian action [1]. We have recently obtained an exact analytical solution to the former [2], in particular, in the vicinity of the Stoner instabilty point. I will report on the calculation of the tunneling density of states (TDOS) and the spin susceptibility. Near the instability point the TDOS exhibits a non-monotonous behavior as function of the tunneling energy (in accordance with perturbation theory [3]) even at temperatures higher than the exchange energy. Our approach is generalizable to a broad set of observables, including the a.c. susceptibility and the absorption spectrum for anisotrpic spin interaction. I will show how the introduction of disorder to the single electron Hamiltonian , with different classes of disorder symmetries, affects the results.

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