LOCAL FRANCK-CONDON FACTORS IN SUSPENDED CARBON NANOTUBE QUANTUM DOTS

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When electrons tunnel through a quantum dot embedded into a suspended carbon nanotube (CNT), quantized vibrational modes (vibrons) can be excited [1,2]. In such systems, vibrons couple *both* to the total dot charge *and* to electron density fluctuations. For the description of such systems however the Anderson-Holstein (AH) model, in which the vibron couples *only* to the total charge, is usually employed. The AH model yields *position-independent* Franck-Condon (FC) factors - giving rise to the FC blockade phenomenon [3] which has been confirmed in a recent experiment [2].

In this work [4] it will be shown that the effects of density fluctuations are indeed *crucial* when the size and location of the dot and of the vibron do not coincide. For a vibron *smaller* than the quantum dot *local* FC factors, with a strong dependence on position, arise - in sharp contrast with the predictions of the AH model. This has profound consequences on the transport properties of the system. With our theory we are able to explain a peculiar suppression of conductance traces observed in recent experiments [2] in terms of *position-dependent* FC factors.

References

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