Decoherence in Aharonov-Bohm Ring with Embedded Quantum Dot in Kondo Regime

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In an Aharonov-Bohm (AB) ring with an embedded quantum dot, the coherence in the quantum dot can be detected by the transport. In the Kondo regime, the transport through the quantum dot is totally elastic at temperature $T = 0$, whereas inelastic processes become dominant at large T.[1] To examine the decoherence by the inelastic processes, we theoretically examine the conductance in an AB ring with an embedded quantum dot in the Kondo regime. First, we adopt the "poor man's" scaling method. We derive an analytical expression for the conductance at $T \ll T_{\rm K}$.[2] The term of T^2 decreases the amplitude of the AB oscillation. Second, we evalulate the conductance by elastic and inelastic processes separately using the Kubo formula, in order to elucidate the origin of the decoherence. We find that the magnetic-flux dependence of the inelastic part of the conductance is defferent from that of the elastic part. The decoherence due to the inelastic scattering is enhanced with increasing the temperature.

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[2]R. Yoshii and M. Eto, J. Phys. Soc. Jpn. **77**, 123714 (2008); R. Yoshii and M. Eto, arXiv/1012.0128 (Phys. Rev. B, in press).