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Quantum Fluctuations of Local Magnetoresistance in Organic Spin Valves[1] MIKHAIL RAIKH, ROBERT ROUNDY, University of Utah, DEMITRY NEMIROVSKY, VICTOR KAGALOVSKY, Sami Shamoon College of Engineering, Beer Sheva, Israel — Aside from interfacial effects, the performance of organic spin valves is limited by the spin memory loss in course of electron transport between the magnetized electrodes. One of the most prominent mechanisms of this loss is the spin precession in the random hyperfine fields of nuclei. We assume that the electron transport is due to incoherent multi-step tunneling. Then the precession takes place while electron "waits" for the subsequent tunneling step. While the spatial coherence of electron is lost after a single step, the spin evolution remains absolutely coherent all the way between the electrodes. As a result, the *amplitudes* of subsequent spin rotation interfere with each other. We demonstrate that this interference leads to a wide spread in the *local* values of tunnel magnetoresistance (TMR). Moreover, if *on average* the TMR is positive, the portion of the surface area where the TMR is negative is appreciable. We calculate analytically and numerically the distribution of local TMR as a function of the spin-valve thickness.

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