Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

On a relation between the high and low frequency noise ALEXANDER SHNIRMAN, GERD SCHÖN, Institut für Theoretische Festkörperphysik, University of Karlsruhe, D-76128 Karlsruhe, Germany, IVAR MARTIN, Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545, USA, YURIY MAKHLIN, Landau Institute for Theoretical Physics, Kosygin st. 2, 117940 Moscow, Russia — Low-frequency (1/f) noise dominates the decoherence in most superconducting qubits. Thus it is very important to understand its origin and properties. Recently, coherent two-level systems have been observed in Josephson junctions [1]. These systems influence strongly qubits' dynamics at high ($\sim$ 10 GHz) frequencies. In addition, recent experiments [2] indicate a connection between the high- and low-frequency noise. In this work we note that an ensemble of coherent two-level systems produces simultaneously high- and low-frequency noise. The relation between these two contributions depends on the statistical properties of the ensemble. We analyze several possible distribution functions and relate the results to the known experimental facts. We also note that a similar relation holds for ensembles of many-level fluctuators with discrete spectrum. [1] R.W. Simmonds et al., Phys. Rev. Lett. 93, 035301 (2004) [2] O. Astafiev et al., cond-mat/0411216 (2004)

Alexander Shnirman
Institut für Theoretische Festkörperphysik, University of Karlsruhe
D-76128 Karlsruhe, Germany

Date submitted: 04 Dec 2004 Electronic form version 1.4