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Surface spins in superconducting qubits: noise of noise and noise of inductance ALEXANDER SHNIRMAN, PABLO SCHAD, BORIS NAROZHNY, GERD SCHOEN, Karlsruhe Institute of Technology — In the last several years a growing bulk of experimental evidence has emerged explaining the 1/f magnetic flux noise in superconducting circuits, e.g., qubits, by a very high density of paramagnetic impurities on the surfaces or interfaces of the superconducting metal. A theoretical picture of this phenomenon is still missing. Here we study a model of weakly interacting dissipative spins or spin clusters with the aim to determine their noise properties. In particular we compare the noise of noise (second spectrum) with the noise of the magnetic susceptibility measured as noise of inductance. Both of these were recently studied in experiments. We argue that the noise of noise is dominated by a simple gaussian background, whereas the noise of susceptibility can provide a hint about the microscopic nature of the spins. In particular we discuss the influence of the spin-spin interactions on the susceptibility noise.

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