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Noise in SQUID inductance as a result of motion of scattering centers KOSTYANTYN KECHEDZHI, Department of Physics and Astronomy, Rutgers, 136 Frelinghuysen rd, Piscataway, 08854 NJ USA — Recent experiments [1] studied 1/f noise in the inductance of superconducting quantum interference devices (SQUIDs) which showed correlation with the usual flux noise. In this work we analyze theoretically the noise in the kinetic inductance of a disordered superconductor produced by motion of scattering centers. The phase coherent diffusion of electrons at the scales shorter than the coherence length of the superconductor is sensitive to changes in spatial configuration of scatterers in the sample and hence to their motion. We use diagrammatic perturbation theory in $k_F\ell \gg 1$ to compute the magnitude of the effect which turns out to be much larger than a naive order of magnitude estimate. Our result sets a lower bound on the magnitude of the inductance noise in realistic superconducting devices such as those studied in [1].

[1] S. Sendelbach, D. Hover, M. Muck, and R. McDermott, Phys. Rev. Lett. 103, 117001 (2009)

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