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Spectrum of Kelvin-wave turbulence in superfluids

Victor S. L'vov, Sergey Nazarenko

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We derive a type of kinetic equation for Kelvin waves on quantized vortex filaments with random large-scale curvature, that describes step-by-step (local) energy cascade over scales caused by 4-wave interactions. Resulting new energy spectrum $E_{LN}(k) \propto k^{-5/3}$ must replace in future theory (e.g. in finding the quantum turbulence decay rate) the previously used spectrum $E_{KS}(k) \propto k^{-7/5}$, which was recently shown to be inconsistent due to nonlocality of the 6-wave energy cascade.

Comments: 4+2 pages, extended version of the PRL submission with appendix

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