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"Pheudo-cyclotron" radiation and transport of non-relativistic particles in inhomogeneous sub-Larmor-scale electro-magnetic fields[1]

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— Plasma turbulence in some astrophysical objects (e.g., weakly magnetized collisionless shocks in GRBs and SN) has small-scale electro-magnetic field fluctuations. We study spectral characteristics of radiation produced by particles moving in such turbulence and relate it to transport properties (diffusion) of these particles. It was shown earlier that relativistic particles produce jitter radiation, which spectral characteristics are markedly different from synchrotron radiation. Here we study radiation produced by non-relativistic particles. Unlike radiation in homogeneous field, which spectrum consists of a single cyclotron harmonic, radiation in the sub-Larmor-scale turbulence reflects statistical properties of the underlying magnetic field. We present both analytical estimates and results of *ab initio* numerical simulations. We also show that particle propagation in such turbulence is diffusive and evaluate the diffusion coefficient. We demonstrate that the diffusion coefficient correlates with some spectral parameters. These results can be very valuable for remote diagnostics of laboratory and astrophysical plasmas.

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