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Astrophysical magnetic micro-turbulence: relation of diffusion of relativistic electrons to the emitted radiation spectra[1] B. KEENAN, M.V. MEDVEDEV, U. Kansas — Kinetic (Weibel-type) instabilities are ubiquitous in astrophysical high-energy density environments, e.g., in relativistic collisionless shocks, reconnection of strong magnetic fields in neutron star and magnetar magnetospheres, interaction regions of relativistic winds from neutron stars with the interstellar medium, and so on. Such instabilities generate strong (sub-equibartition) magnetic fields which reside at small, sub-Larmor scales. Efficient electron acceleration to relativistic energies is not uncommon in such environments. Spectra of radiation emitted by these relativistic electrons, called jitter radiation, can deliver wealth of information about the internal structure of such "Weibel turbulence." The small-scale fields simultaneously affect the particle transport via pitch-angle diffusion. Both effects are related and can be used to diagnose the astrophysical plasmas. Indeed, the radiation pattern is intimately related to the particle orbits and, thus, to the transport properties of the turbulence. We study such a relation between transport in and radiation from micro-scale turbulence via numerical simulations and analysis.

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