Resonance Coherency, Transport Events and Spreading of CTEM Turbulence

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The dynamics of precession-resonant electrons which trigger CTEM turbulence is tightly constrained, and effectively one dimensional. Thus, in the absence of strong dispersion resonance coherence times are long, so formation of electron phase space structures and granulations is likely. Such long-lived granulations will Cerenkov emit radially propagating waves, thus enhancing the now familiar process of turbulence spreading, and giving rise to a new class of purely collisionless non-locality phenomena.

Here, we present a fully kinetic theory of CTEM turbulence spreading. The theory is constructed via coupling:

- 1. a two point correlation equation for trapped electron granulations structure [1]
- 2. a phase space intensity equation for evolution of the excitation profile
- 3. an evolution equation for the mean distribution, which incorporates granulation effects.

This model incorporates both "avalanche" and nonlinear scattering effects. Preliminary results indicate that wave screening of granulations near marginality may significantly enhance the spreading speed beyond the usual Fisher equation estimate.

[1] P. H. Diamond, et. al. IAEA '82 Proceedings