“NONLINEAR THEORY OF ELECTROMAGNETIC WAVE GENERATION AND AMPLIFICATION BASED ON THE ANOMOLOUS DOPPLER EFFECT” N. S. Ginzburg

1. If the wave phase velocity is then less than the longitudinal velocity of the electrons moving in the homogeneous magnetic field, induced radiation can develop even when the electrons have no initial transverse velocity.
2. We will consider the interaction between a beam of electrons entering the system with velocity vii parallel to the magnetic field H = H0z, and a circularly polarized TEM wave of variable amplitude, propagating in a homogeneous dielectric with index of refraction n > 1.

Questions: Electromagnetic Acceleration[1]

A potential extension of this study is that it provides a perspective on electron heating and current drive by electromagnetic waves. For instance, during the NDR process with a plane wave of right-hand polarization, given a certain wave energy input into the plasma, the electron heating coefficient may also relate with . Meanwhile, the current drive coefficient can be related with . Both heating and current drive occur only at the resonant velocity vz=(kz . Therefore, to achieve efficient heating, in addition to considering the resonant velocity, the ratio should also be regarded as a crucial factor. Actually, the heating process and current driven or scattering process is a nonlinear effect, for example , the complex environment and spectral width , and cannot be treated by the analysis offered in this letter. Neverthless , although a strict comparsion is not appropriate , it may be heuristic to explore the complex phenomenon from single electron, and get basic physis of wave-partical interaction. On the other hand, the ADE process induces electron velocity scattering, which presents a potential method for suppressing runaway electrons in tokamaks.

[1] Liu H, He X, Chen S and Zhang W 2004 Particle acceleration through the resonance of high magnetic field and high frequency electromagnetic wave *arXiv preprint physics/0411183*