

in Magnetized Solid Density Plasma

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The effects of strong magnetic field on high-intense laser matter interactions have been studied a lot recently [1-2]. Magnetic field of several kilo-tesla is now available not only by self-generation but also by externally applying. In this report, the high-intense laser matter interactions in the presence of strong magnetic field have been studied by PIC simulation. The magnetic field is the order of 10^4 tesla and applied parallel to the propagation direction of the linearly polarized laser. In this case, the electron cyclotron frequency is close to the laser frequency and the laser can penetrate into the high density area as whistler mode.

We find that the laser partially changes its polarization due to the reflection/penetration (see Fig.1) and the electrons does not oscillate in the pre-plasma area. In the higher density area, the wave gradually develops into a wave package due to density inhomogeneity. It spreads up in space as the wave propagates because of dispersion of whistler mode. We have also observed higher absorption rate and electron temperature compared with the case without magnetic field.

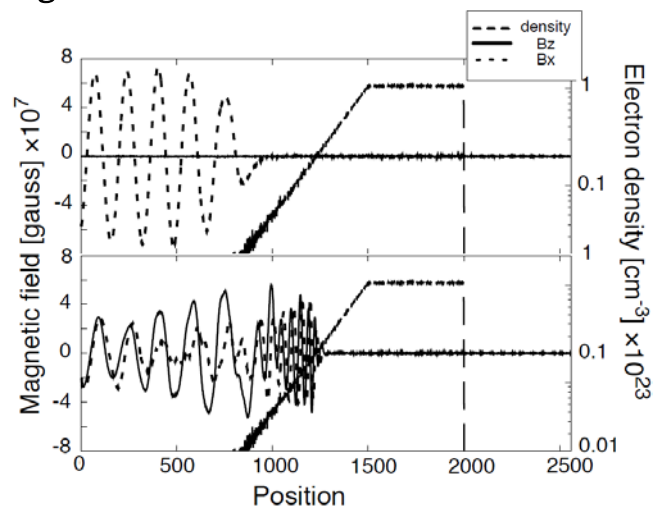


Fig. 1. Electromagnetic field without (up) and with (down) external magnetic field

References

- [1] P. Y. Chang et al, Phys. Rev. Lett. 107, 035006, 2011.
- [2] D. J. Strozzi et al, Phys. Plasmas 19, 072711, 2012.