Study of plasma microfield properties in highly magnetized plasmas.

S. Ferri, L. Dakroub and A. Calisti

Aix-Marseille Université, CNRS, PIIM, UMR 7345, Marseille, FRANCE

Highly magnetized media have been a great deal of interest in recent years. They occur in the high-energy-density (HED) environments characteristic of intense laser-matter interactions and astrophysical compact objects. Kilotesla magnetic fields can be generated in plasmas in which the temperature can reach several hundreds of eV and densities are up to $10^{21}cm^{-3}$. In such extreme conditions, the atoms of the medium are partially ionized resulting in a mixture of ions, electrons and neutrals. The emitted radiation from those ionized species is closely related to the atomic physics and the plasma environment. The presence of B-field leads, among other phenomena, to bending trajectories of the charged particles into a helical path. Such trajectories can have an effect on the Stark-Zeeman broadening mechanisms of spectral line shapes.

The present study is to investigate the influence of the bending trajectories of the charged particles on the statistical properties of the plasma microfields. To do so, Molecular Dynamics simulations, [1], in presence of B-field is used for plasma conditions related to laser driven capacitor-coil targets experiments, [2,3,4].

This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programs 2014-2018 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.

REFERENCES

[1] B. Talin et al., Molecular dynamics simulation for plasma spectroscopy. J. Phys. A Math. Gen., **36**, 6049 (2003)
[2] S. Fujioka et al., Kilotesla magnetic field due to a capacitor-coil target driven by high power laser. Scientific Reports, 3, 2013.
[3] Joao J. Santos et al, *Towards a universal Stark-Zeeman code for spectroscopic diagnostics and for integration in transport codes »,* Inertial Research Fusion Energy Proposal CfP-AWP17-IFE
[4] Joao J. Santos et al. , *Laser-driven strong magnetostatic fields with applications to charged beam transport and magnetized high energy-density physics, accepted in Physics of Plasma*