Prospects of strongly magnetized plasma experiments as a testbed for development of spectroscopic diagnostics

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The advent of 0.1 – 10 PW laser user facilities and the opening of multi-beam ns-laser facilities of large energy for academic research in Europe, along with novel laser-driven, controlled sources of strong quasi-static magnetic fields is nourishing the interest for laser-driven magnetized high-energy-density systems. In the context of inertial confinement fusion (ICF), magnetized implosions can lead to higher fusion gains through mitigation of hydrodynamic instabilities, reduced heat conduction or by an enhanced confinement of the thermonuclear particles. Anisotropic thermal-electron diffusion and enhanced collision rates may impact on the micro-fields and ion dynamics and on the shell or dopant material opacities. Improvements on Stark-Zeeman line shape calculation can provide a new analysis and interpretation of existing and future ICF spectroscopic data.

The work presented here, is a part of the international research project *StarkZee*, recently funded through the EUROfusion Enabling Research program which aims at developing an accurate Stark-Zeeman line shape code for any emitter and any plasma conditions especially when the effects of an external magnetic field dominate over the spin-orbit interaction. The code should be fast enough to be implemented in transport codes, and will be benchmarked by confrontation with spectroscopic data from well controlled laboratory experiments able to generate quasi-static magnetic fields of controlled strength and polarization. After a summary of the goals and work-plan of the project, the first results corresponding to various possible schemes of experiments will be presented.

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