Invited Lecture

MODELING OF STARK-ZEEMAN LINES IN MAGNETIZED HYDROGEN PLASMAS

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We report on recent investigations of Stark-Zeeman hydrogen lines in magnetized plasmas motivated by controlled fusion research. In specific scenarios, the edge plasma in tokamak discharges involve a density sufficiently high (up to a few 10^{15} cm^{-3}) and a temperature sufficiently low (down to $T_e < 1$ eV) so that the hydrogen isotope lines routinely measured for diagnostic purposes are affected by Stark broadening and can be used as a probe of the electron density. An analysis of lines with a low principal quantum number such as Dα requires a careful treatment because the Stark broadening can be of the same order as the Doppler broadening and it can be affected by ion dynamics. Furthermore, the presence of a strong magnetic field (of the order of several teslas) results in an alteration of the energy level structure, which is not straightforward even for hydrogen due to the simultaneous action of the magnetic field and the plasma's microscopic electric field. In this work, we present models and discuss their applicability to the diagnostic of white dwarfs that are subject of an intense magnetic field. The influence of line reabsorption on the interpretation of spectra is also discussed.