DAMOP12-2012-000014

Abstract for an Invited Paper
for the DAMOP12 Meeting of
the American Physical Society

Broadening of Hydrogenic Spectral Lines in Magnetized Plasmas: Diagnostic Applications

EUGENE OKS, Auburn University

In diagnostics based on the broadening of spectral lines in plasmas, magnetic fields are important only if their strength is relatively high – to compete with the Stark and Doppler broadenings. Relevant examples are plasmas produced by ultrashort, high intensity lasers and edge plasmas of magnetic fusion experiments. The focus of this invited talk is at hydrogenic spectral lines. This is because the generally complicated physics of the Stark-Zeeman broadening can be best understood and used in practice for spectral lines of one-electron systems: hydrogen atoms and hydrogenlike ions. Besides, this subject is also theoretically important for two reasons. First, it deals with a deeply fundamental problem of the simplest, two-particle bound Coulomb system immersed in a multi-particle Coulomb system of free charges (plasma) exhibiting long-range interactions. Second, due to the fact that a bound two-particle Coulomb system possesses a higher algebraic symmetry than its geometrical symmetry, sophisticated analytical advances can be made into the problem of the broadening of spectral lines of such a system in a plasma, thus yielding a profound physical insight and leading to innovative diagnostic applications.