

STARK BROADENING IN ASTROPHYSICS

Milan S. Dimitrijević, Zoran Simić

Astronomical Observatory, Volgina 7, 11060 Belgrade, Serbia

Broadening of spectral lines by collisions with charged particles - Stark broadening is considered and analyzed here, from the point of view of applications in astronomy. It is of interest especially for analysis and synthesis of hot star spectra, in particular in the case of white dwarfs and pre-white dwarf stars but also for A and B type stars. It is of interest even for cooler star atmospheres as e.g. Solar one. Namely, the influence of Stark broadening within a spectral series increases with the increase of the principal quantum number of the upper level and consequently, Stark broadening contribution may become significant even for the Rydberg lines in the Solar spectrum. It is also of interest for modelling and analysis of sub photospheric layers. This broadening mechanism is also of significance for the research of neutron stars and the investigation of radio recombination lines from molecular and ionized hydrogen clouds.

Stark broadening parameters are also needed for a number of problems in astrophysics as the determination of the chemical composition of stellar atmospheres, stellar elemental abundances determination from equivalent widths of absorption lines, estimation of the radiative transfer through the stellar plasmas, especially in subphotospheric layers, and for opacity calculations. radiative acceleration considerations, nucleosynthesis research etc.

In this lecture it will be reviewed and discussed astronomical applications of Stark broadening, as well as the results of Stark broadening study in Serbia, relevant to astrophysical problems.

Additionally, organization of Stark broadening data in STARK-B database and FP-7 VAMDC (Virtual Atomic and Molecular Data Center) european project will be discussed.