Publ. Astron. Obs. Belgrade No. 89 (2010), 341 *Topical Lecture*

CASE STUDIES ON RECENT STARK BROADENING CALCULATIONS AND STARK-B DATABASE DEVELOPMENT IN THE FRAMEWORK OF THE EUROPEAN PROJECT VAMDC (VIRTUAL ATOMIC AND MOLECULAR DATA CENTER)

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Abstract. Stark broadening theories and calculations have been extensively developed for about 50 years. The theory can now be considered as mature for many applications, especially for accurate spectroscopic diagnostics and modelisation. In astrophysics, with the increasing sensitivity of observations and spectral resolution, in all domains of wavelengths from far UV to infrared, it has become possible to develop realistic models of interiors and atmospheres of stars and interpret their evolution. For hot stars, especially white dwarfs, Stark broadening is the dominant collisional line broadening process. This requires the knowledge of numerous collisional line profiles, especially for very weakly abundant atoms and ions that are used as useful probes for modern spectroscopic diagnostics. Hence, calculations based on a simple but enough accurate and fast method is indispensable for obtaining numerous results. Ab initio quantum calculations are also a useful domain of development, especially for ion emitters. Nowadays, the access to such data via an on line database becomes indispensable. The Virtual Atomic and Molecular Data Centre (VAMDC, http://www.vamdc.eu) is a European Union funded collaboration between groups involved in the generation and use of atomic and molecular data. VAMDC aims to build a secure, documented, flexible and interoperable e-science environment-based interface to existing atomic and molecular data. In this framework, the Stark-B (http://stark-b.obspm.fr) database, which is a part of VAMDC, is a collaborative project between the Astronomical Observatory of Belgrade and the Laboratoire d'Etude du Rayonnement et de la Matière en Astrophysique (LERMA). It is a database of calculated widths and shifts of isolated lines of atoms and ions due to electron and ion collisions (i.e. impacts are separated in time). This database is devoted to modelisation and spectroscopic diagnostics of stellar atmospheres and envelopes. In addition, it is relevant to laboratory plasmas, laser equipments and technological plasmas. Hence, the domain of temperatures and densities covered by the tables is wide and depends on the ionization degree of the considered ion. We will present some recent results and the Stark-b database at the Conference.