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STARK BROADENING OF B IV LINES FOR ASTROPHYSICAL AND LABORATORY PLASMA RESEARCH

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The study presents Stark broadening parameters (widths and shifts) of B IV spectral lines determined using Sahal-Bréchot theory based on the semi-classical perturbation formalism [1, 2]. Data on Boron lines are of interest in astrophysics, astrochemistry, and cosmology, in technological plasma research, for thermonuclear reaction devices, and for laser produced plasma investigation. For abundance determinations of boron and modellisation and analysis of stellar plasma it is necessary to have reliable atomic and spectroscopic data, including Stark broadening parameters. This enable to provide data on the astrophysical processes that can both produce and destroy this rare element. Namely, the light elements lithium, beryllium, and boron (LiBeB) are sensitive probes of stellar models due to the fact that the stable isotopes of all three consist of nuclei with small binding energies that are destroyed easily by (p, a) reactions at modest temperatures [3]. The origin and evolution of boron are of special interest because it is hardly produced by the standard big bang nucleosynthesis (BBN), and cannot be produced by nuclear fusions in stellar interiors [4]. The cosmic abundance of 11B is of major importance for the model of Galactic chemical evolution (GCE) [5]. In Ref. [5] authors concluded that a major portion of the cosmic abundance of 11B can be attributed to neutrino nucleosynthesis. Thus, it is necessary to accurately describe the stellar evolution, and the formation of elements, which are closely connected. To make progress in these developments chemical abundances are crucial parameters to be determined. This needs an accurate interpretation of the detailed line spectra of the stellar objects.

References

[1] S. Sahal-Bréchot: 1969, *Astron. Astrophys.*, **1**, 91.
[2] S. Sahal-Bréchot: 1969, *Astron. Astrophys.*, **2**, 322.
[3] K. Cunha and V. V. Smith: 1999, *ApJ*, **512**, 1006-1013.
[4] K. Tan, J. Shi and G. Zhao: 2010, *ApJ*, **713**, 458-468.
[5] A. M. Ritchey, S. R. Federman, Y. Sheffer and D. L. Lambert: 2011, *ApJ*, **728**, 70.