Stark Broadened Line Profiles of Neutral Strontium Lines in Plasma Conditions

Milan S. Dimitrijević[1] and Sylvie Sahal–Bréchot[2]

[1]Astronomical Observatory, Volgina 7, 11050 Belgrade, Serbia, Yugoslavia;
[2]Observatoire de Paris–Meudon, 92190 Meudon, France

During more than twenty years, we are making a continuous effort to provide Stark-broadening parameters needed for research of astrophysical, laboratory and laser produced plasma. A review of our results is presented in Dimitrijević, 1996). Such data are of interest for the consideration of a number of problems in astrophysics, physics and technology as *e.g.* for stellar plasma diagnostic, opacity calculations, the investigation/modelling of stellar spectra or a particular line, laboratory plasma diagnostic, laser produced plasmas, thermonuclear research, plasma technology, as well as for different examinations of regularities and systematic trends for e.g. homologous atoms (Dimitrijević and Popović, 1989) or in general (Purić *et al.* 1991).

Strontium lines are present in solar and stellar spectra. E.g. Komarov & Basak (1993) have found neutral strontium lines in the spectra of Sun and two Praesepe's stars. They are also of interest since Sr is one of thermonuclear s - processes product in stars and its over-abundance is observed in CH and metal deficient barium stars (Šleivyté & Bartkevičius, 1995).

We have calculated within the semiclassical-perturbation formalism (Sahal–Bréchot, 1969ab) electron-, proton-, and ionized helium-impact line widths and shifts for 33 Sr I multiplets. All details of calculations are given in Dimitrijević and Sahal - Bréchot, 1996a and in references therein. In addition to electron-impact full halfwidths and shifts, Stark-broadening parameters due to proton-, and He II- impacts have been calculated. Our results for 33 Sr I multiplets, for perturber densities 10^{13} cm^{-3} (for stellar plasma research) and $10^{15} - 10^{18}$ cm^{-3} (for laboratory plasma research) and temperatures T = 2,500 – 50,000 K, will be published elsewhere (Dimitrijević and Sahal - Bréchot, 1996a,b). The accuracy of the results obtained decreases when broadening by ion interactions becomes important.

REFERENCES

Dimitrijević, M.S., 1996, Zh. Prikl. Spektrosk., 63, 810
Dimitrijević, M.S. and Popović, M.M., 1989, Astron. Astrohys., 217, 201.
Dimitrijević, M.S., and Sahal–Bréchot, S., 1996a, Astron. Astrophys. Suppl. Series, in press.
Dimitrijević, M. S., and Sahal–Bréchot, S., 1996b, Bull.Astron.Belgrade, 153, 89.
Komarov, N.S., and Basak, N.Yu.:,1993, Astron. Zh., 70, 111.
Purić, J., Dimitrijević, M.S. and Lesage,A.: 1991, Astrophys. J., 382, 353.
Sahal-Bréchot, S., 1969a, Astron.Astrophys., 1, 91.
Sahal-Bréchot, S., 1969b, Astron.Astrophys., 2, 322.
Sleivyté, J., Bartkevičius, A., 1995, Vilniaus Astronomijos Observatorijos Biuletenis, 85, 3.

https://doi.org/10.1017/S0074180900130402 Published online by Cambridge University Press