On the Stark Broadening in Hot Stars

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Abstract

In hot star atmospheres exist conditions where Stark widths are comparable and even larger than the thermal Doppler widths, so that the corresponding line broadening parameters are of importance for the hot star plasma investigation. Here, we investigated theoretically the influence of collisions with charged particles on heavy metal spectral line profiles for Te I, Cr II and Sn III in spectra of A stars and white dwarfs. We applied semiclassical perturbation theory. When it can not be applied in an adequate way, due to the lack of reliable atomic data, we used modified semiempirical theory.

We presented Stark broadening parameters, widths and shifts, for four Te I spectral lines, four resonant Cr II $3d^5$-$3d^4$4p spectral lines and two Sn III spectral lines. In the case with the available experimental and other theoretical data for the considered spectral lines we analyzed the agreement or a disagreement with our theoretical results. Also, here we considered the contributions of different collisional processes to the total Stark width in comparison with Doppler one.

We made a detailed analyzes of obtained results in order to compare Doppler and Stark broadening contributions in hot star atmospheres. We found that Stark broadening mechanism may be important in such plasma conditions and should be taken into account.

On the Stark Broadening of Cu I Spectral Lines

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Abstract

We investigate here the Stark broadening parameters of neutral cooper spectral lines. This metal is often used in electrical industry as electrode materials, so that the data on its spectral lines are important not only for plasma research but also for diagnostic techniques in industrial laboratories.

Recently, temperature dependence of Stark width for neutral atom spectral lines is investigated (Zmerli et al., 2008), in order to find a method for scaling of Stark broadening parameters with temperature, better than the dependence $T^{1/2}$. In this work, Stark width dependence on T is analyzed using the lines of neutral helium.

Here, we calculated, using semiclassical perturbation theory of Sahal-Bréchot Stark widths and shifts for CuI 324.75, 327.39, 510.54, 515.32, 521.82 and