Poster paper

THE INFLUENCE OF ION-ATOM AND ATOM-RYDBERG ATOM PROCESSES TO THE CONTINUOUS AND LINE SPECTRA OF STELLAR ATMOSPHERES

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In several papers was demonstrated the influence of a group of collisional chemi-ionization and chemi-recombination processes on the excited atom populations in hydrogen and helium plasmas with the ionization degree less than 10^{-3}. We have in view here the ionization processes $A^*(n) + A \rightarrow e + \{A^+ + A\}$; $A^*(n) + A \rightarrow e + A_2^+$ and the corresponding inverse recombination processes $e + A^+ + A \rightarrow A^*(n) + A$; $e + A_2^+ \rightarrow A^*(n) + A$, where A = H(1s) or He(1s^2), $A^+ = H^+$ or $He^+(1s)$, $A^*(n) = H^*(n)$ with n larger or equal to 4, or $He^*(n)$ with n larger or equal 3, A_2^+ - molecular ion in the ground electronic state, and e – free electron.

The obtained results were than used for the investigation of the importance of these processes, for A = H in Solar atmosphere and for A = He in atmospheres of some DB white dwarfs. It was shown that these processes could not be taken into account as *a posteriori* corrections of results obtained with the standard models of atmospheres, but should be included *ab initio* in the modelisation. For such a purpose the most adequate is the computer code for the stellar atmospheres modelling PHOENIX where the computations are performed just *ab initio*. The influence of the considered processes on the structure of the stellar atmosphere model was investigated with the help of PHOENIX code on the example of the M red dwarf atmosphere, with T_{eff} = 3800 K. It was shown that that their inclusion changes considerably the $H^*(n)$ atom population distribution up to n = 20, without any tendence of decrease of this influence with the increase of n. This last result suggested that the considered atomic processes should influence directly and indirectly on the spectral line shapes.

We review here obtained results and present an ab initio synthesis of several hydrogen spectral lines, performed with the PHOENIX for a K type stellar atmosphere with T_{eff} = 3300 K.