



Electron-ion Recombination and Photoionization of Ti I

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Abstract

Ti I is commonly seen in the absorption spectra of red giant stars, cool M stars, Large Magellanic Cloud. They are easily ionized and form TiO. The amount of Ti locked in TiO can have direct effect on fluxes, spectral energy distributions and thus in determination of fundamental stellar parameters and abundances for these objects. Ionization fraction of the ions available requires both photoionization cross sections and recombination rate coefficients. Parameters for these processes are needed for spectral analysis for the objects. Ti I, a neutral atom of 22 electrons with open 3d shell, is a complex system due to strong electron-electron correlation effect and large number of bound states. The R-matrix calculations using a large wave function expansion reveals prominent resonant structures in the low energy region [1] indicating availability of photoionized ion Ti II to combine with oxygen. The resonant features will increase the opacity, as expected of astrophysical observation, and hence play important role in determination of abundances of elements. Level-specific and total recombination rates are being calculated under the Iron Project (AA 279, 298 1993). Features of recombination spectra with electron energy will also be presented. [1] S.N. Nahar, New Ast. (in press 2015)

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