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Multi-Ionization and Suppression of Dielectronic Recombination for the ionization equilibria of kappa-distributions

Kappa-distributions are particle distributions with a Maxwellian core and high-energy tail. They have strong theoretical support and can originate in the solar corona and transition region as a result of heating processes. Distributions with high-energy tail influence individual ionization, recombination and collisional excitation rates what affects the ionization equilibrium, populations of the energy levels and finally the line intensities. Now we included to our calculations of the ionization equilibria for the kappa-distributions also the multi-Ionization and suppression of dielectronic recombination. We have showed that the effect of multi-ionization increases with the importance of the high-energy tail of distribution. Reversely, the effect of the suppression of dielectronic recombination on the ionization equilibria decreases with increasing number of high-energy particles. This new ionization equilibria were added into the latest version of KAPPA package (software and database, <http://kappa.asu.cas.cz/>), what allows us to calculate synthetic spectra and propose diagnostics for kappa-distributions.

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