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KAPPA package - the latest update

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The presence of non-Maxwellian distributions in the solar corona is supported by many theoretical calculations and several successful spectroscopic diagnostics from UV and EUV lines in the flares, solar corona and transition region. The kappa-distributions or any other distributions exhibiting high-energy tails can also be expected as a result of particle acceleration processes by nanoflare heating in the solar corona.

Non-Maxwellian distributions generally lead to modification of line intensities compared to Maxwellian ones. This is because rates of individual ionization, recombination and collisional excitation are an integral product of the cross-section multiplied by the distribution. In principle, this enables diagnostics of non-Maxwellian distributions from observed spectra.

The KAPPA software combines our own routines with many modified and original CHIANTI 10 routines and allows comfortable handling like CHIANTI. The extensive KAPPA database contains the total and level resolved excitation, ionization, and recombination rates together with the newest ionization equilibria for kappa-distributions ($\kappa = 2, 3, 4, 5, 7, 10, 15, 25, \text{ and } 33$). These data together with corresponding atomic data and Maxwellian averaged data are available for all elements and ions included in the CHIANTI. The KAPPA provides fast calculations of synthetic spectra for kappa-distributions, search for diagnostic opportunities, and enables to study the influence of kappa-distributions on the observed temperature distribution in emitting plasma (DEM).

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