IX SERBIAN CONFERENCE ON SPECTRAL LINE SHAPES IN ASTROPHYSICS
May 13-17, 2013, Banja Koviljača, Serbia
Book of Abstracts, Eds. L. Č. Popović, M. S. Dimitrijević, Z. Simić and M. Stalevski
Astronomical Observatory Belgrade, 2013

STRUCTURAL AND COLLISIONAL DATA FOR Mg III AND Al IV

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Neon-like ions have a high abundance over a wide range of electron temperatures and densities because of their closed-shell configuration ground state. Therefore, they play an important role in the diagnostics of a wide variety of laboratory and astrophysical plasmas. They are used to study transport and connement of high-Z impurity ions in tokamaks. They are of great interest for developing soft X-Ray and VUV lasers [1,2]. Atomic and collisional data for some Neon-like ions are missing in many known databases such as CHIANTI [3]. Collision strengths for Mg III and Al IV ions are examples of such missing data. This fact is the main idea behind the present work. We present here energy levels, oscillator strengths, radiative decay rates and fine structure collision strengths for these two ions. The radiative atomic data have been calculated with the code AUTOSTRUCTURE [4] where, besides the one-body and the two-body ne structure interactions, the two-body non-fine structure ones (contact spin-spin, orbit-orbit, Darwin...) have been taken into account. The scattering problem has been treated in the Breit-Pauli distorted wave approximation using the same code AUTOSTRUCTURE. Eleven configurations (yielding 75 levels) are included in our calculations: $(1s^2)$ $2s^22p^6$, $2s^22p^53l$, $2s2p^63l$, $2s^22p^54l$. Good agreement has been found between our radiative data and the available experimental and other theoretical ones. Collision strengths have been calculated for a large range of electron energy above all thresholds (reaching 240 Ry). No other collision strengths results for comparison.

References

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