

## Dielectronic Recombination in He-like, Li-like and Be-like Iodine and KLM Resonances

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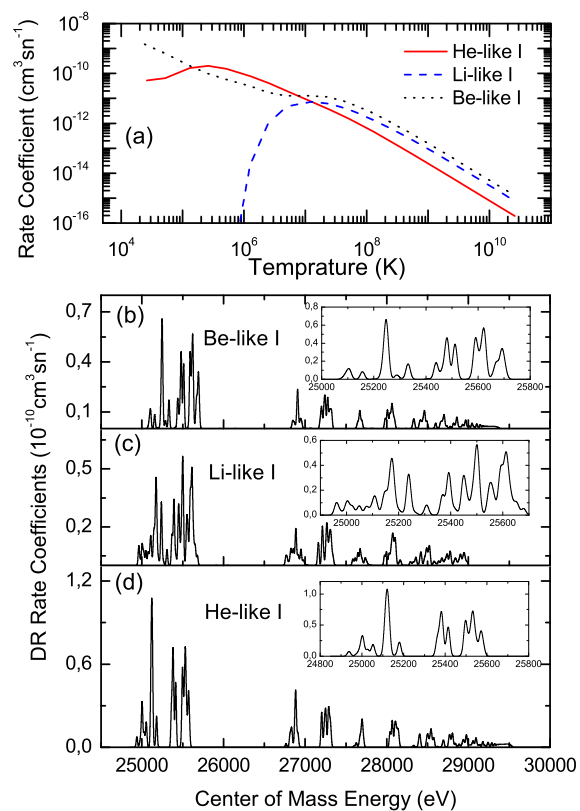
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**Synopsis** DR rate coefficients for He-like, Li-like and Be-like Iodine ions and KLM resonances are calculated using MCBP approximation.

Dielectronic recombination (DR) rate coefficients are needed for determining both the level populations and the ionization balance of plasmas over a wide range of electron temperatures and densities and plasma timescales. Reliable DR coefficients are essential for the spectral diagnosis of non-equilibrium laboratory and astrophysical plasmas. Here we present DR rate coefficients for highly charged Iodine ions in the He-like, Li-like, and Be-like electron configurations. Calculations were performed both for the ground and metastable initial states within the multi-configuration Breit-Pauli (MCBP) approximations using kappa-averaged relativistic wavefunctions including mass-velocity and Darwin operators in the solution of the radial equations as implemented in the AUTOSTRUCTURE code [1]. Slater-Type orbital model potential to represent the Coulomb interactions between pairs of electrons is used for the calculations of radial orbitals. Both  $\Delta n = 0$  and  $\Delta n = 1$  core excitations involving 1s and 2s subshells were included. The dielectronic capture process to  $nl$  Rydberg levels is assumed to take place explicitly with  $n$  and  $l$  values ranging between 0-6 and 2-25, respectively, for  $\Delta n = 0$  core excitations. For the case of  $\Delta n = 1$  core excitations  $n$  values are explicitly included upto 15. An approximation for the highlevel values of  $n$  was used up to  $n = 1000$  in either cases. Calculations embrace a wide range of electron temperature range ( $10^4 - 10^{10}$ )K. AUTOSTRUCTURE produces raw autoionization and radiative rates which are post-processed to obtain the final-state level-resolved and total DR rate coefficients. Maxwellian-averaged total DR rate coefficients are shown in Figure 1 a. Resonances in Fig. 1 b, c and d result from the autoionizations of  $1s2l3l'$ ,  $1s2s2l3l'$ , and  $1s2s^22l3l'$  configurations associated with the  $\Delta n = 1$  core transitions during the capture of electrons by He-

like, Li-like and Be-like Iodine ions, respectively, with  $l=0-1$  and  $l'=0-2$ .



**Figure 2.** Maxwellian-average rate coefficients for He-like, Li-like, and Be-like Iodine ions(a). (b)-(d) show the resonances resulting from the autoionizations of the  $1s2l3l'$ ,  $1s2s2l3l'$ , and  $1s2s^22l3l'$  for He-like, Li-like, and Be-like Iodine ions, respectively.

### References

- [1] Badnell, N. R., and Pindzola, M. S. 1989, Phys. Rev. A, 39, 1685; Badnell, N. R. 1992, Phys. Rev. A, 46, 660.

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