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

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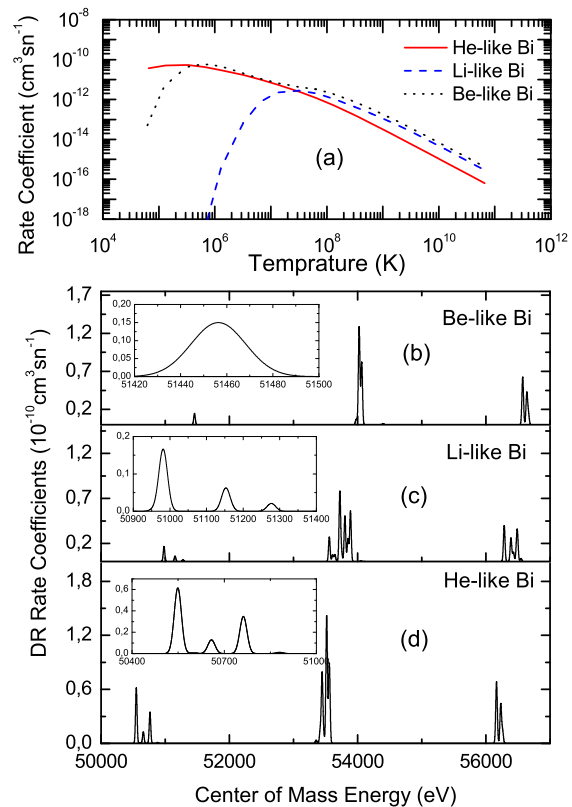
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**Synopsis** DR rate coefficients for He-like, Li-like and Be-like Bismuth ions and KLM resonances are calculated using MCBP approximation.

The spectral emission of highly charged ions with few electrons has been used heavily in the diagnostic analysis of astrophysical and laboratory plasmas. Rate coefficients for dielectronic recombination (DR) process are essential in this respect. We report results from a final state level-resolved DR rate coefficient calculations for the ground and metastable initial levels of He-like, Li-like, and Be-like isonuclear ions of Bismuth. We used the code AUTOSTRUCTURE [1] within the multi configuration Breit-Pauli approximation with kappa-averaged relativistic wave functions. Slater-Type Orbital model potential to represent the Coulomb interactions between pairs of electrons is used for the calculations of radial orbitals. The autoionization rates are calculated in the isolated resonance approximation where both electron-electron and electron-photon interactions are treated to first order. 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 ( $10^5 - 10^{11}$ )K. AUTOSTRUCTURE produces raw autoionization and radiative rates which are post-processed via ADASDR 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, Like-like and Be-like Bis-

muth ions, respectively, with  $l=0-1$  and  $l'=0-2$ .



**Figure 2.** Maxwellian-average rate coefficients for He-like, Li-like, and Be-like Bismuth 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 Bismuth ions, respectively.

### References

- [1] Badnell, N. R. 1986, *J. Phys. B*, 19, 3827; Badnell, N. R. 1997, *J. Phys. B*, 30, 1; Badnell, N. R., OMullane, M., Summers, H. P., et al. 2003, *Astron. and Astrophys.*, 406, 1151.

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