ACCURATE CALCULATION OF ENERGIES AND RADIATIVE RATES FOR LI-LIKE IONS WITH $6 \leqslant Z \leqslant 36$

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Employing a relativistic many-body perturbation theory combined with configuration interaction approach[1,2], we make systematic research and report a complete and consistent data set of energy levels and radiative rates for transitions among the lowest 63 fine-structure levels from the $n \leqslant 8$ configurations in Li-like ions with $6 \leqslant Z \leqslant 36$. The wavelengths, radiative rates, oscillator strengths, and line strengths are reported for all electric dipole, magnetic dipole, electric quadrupole, and magnetic quadrupole transitions among the levels for each single ions. Quantum defect theory, scaling law, and extensive comparisons with laboratory and theoretical results show that the present RMBPT calculations are highly accurate. The present work significantly increases the amount of accurate data in Li-like sequence, and the accuracy of the energy levels is high enough to identifying and interpreting the spectra, especially those from the levels with $n = 5 - 8$ configurations, of which both the experimental and theoretical values are scarce. Meanwhile, the results should be helpful in modeling and diagnosing astrophysical and fusion plasmas.

References

[1] M. F. Gu, ADNDT, 89, 267(2005); ApJS, 156, 105(2005).
[2] K. Wang, et al. , ApJS, 215, 26(2014); ApJS, 218, 16(2015); ApJS, 223, 3(2016).