Energy levels, transition rates and lifetimes for Li-like ions with $Z \leq 10$ in the $1s2s(3S)3\ell$ states
Energy levels, transition rates and lifetimes for Li-like ions with \( Z \leq 10 \) in the \( 1s2s(3S)3\ell \) states

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Synopsis

Energy levels, transition rates and lifetimes for Li-like ions with \( Z \leq 10 \) in the \( 1s2s(3S)3\ell \) states were calculated using the Dirac-Fock approach.

In the continuation of the study of the selective enhancement of \( 1s2n\ell \) metastable states populated by cascades in single-electron transfer collisions of ions with He and H\(_2\) targets [1], we calculated the energy levels, transition rates and lifetimes for Li-like ions with \( Z \leq 10 \) in the \( 1s2s(3S)3\ell \) states states using the multi-configuration Dirac-Fock (MCDF) code of Desclaux and Indelicato [2, 3].

Table 1. Energy levels (EL), Auger and radiative transition rates (ATR, RTR, respectively) and lifetimes for Ne Li-like ions in the \( 1s2s(3S)3s^{2,4}S \) states.

<table>
<thead>
<tr>
<th></th>
<th>( ^2S_{1/2} )</th>
<th>( ^4S_{3/2} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL (eV)</td>
<td>-1750.35</td>
<td>-1760.53</td>
</tr>
<tr>
<td>ATR (s(^{-1}))</td>
<td>3.23x10(^{13})</td>
<td>3.02x10(^{13})</td>
</tr>
<tr>
<td>RTR (s(^{-1}))</td>
<td>3.16x10(^{10})</td>
<td>6.69x10(^{10})</td>
</tr>
<tr>
<td>Lifetime (s)</td>
<td>3.10x10(^{-14})</td>
<td>3.30x10(^{-14})</td>
</tr>
</tbody>
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The radiative and radiationless decay rates were calculated using the code in the single-configuration approach, with the Breit interaction and the vacuum polarization terms included in the self-consistent field calculation, and other QED effects, such as self-energy, included as perturbations [4].

References


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