

## Dielectronic recombination of berylliumlike $\text{Si}^{10+}$ ions at the heavy-ion storage ring TSR

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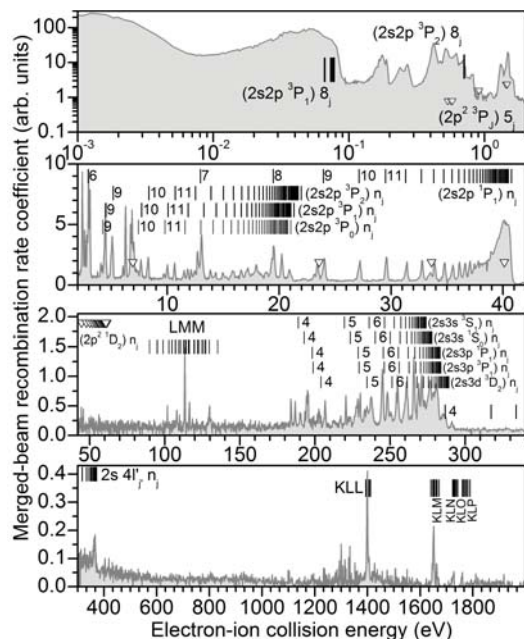
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**Synopsis** Absolute recombination rate coefficients of Be-like  $\text{Si}^{10+}$  have been measured employing the electron-ion merged-beams method at the storage ring TSR. The experimental center-of-mass energy range 0–2000 eV covers dielectronic recombination (DR) resonances associated with K- and L-shell excitations.

Motivated by astrophysical data needs [1], we have measured absolute electron-ion recombination rate coefficients for  $\text{Si}^{10+}$  forming  $\text{Si}^{9+}$ . To this end, an electron-ion merged-beam configuration was used at the heavy-ion storage ring TSR, located at the Max Planck Institute for Nuclear Physics in Heidelberg, Germany.



**Figure 1.** The measured  $\text{Si}^{10+}$  recombination spectrum is displayed as grey shaded curve. Calculated DR and TR resonance positions are represented as black vertical bars and open triangles, respectively.

The rate coefficient was measured for electron-ion collision energies ranging from 0 to 2000 eV and will be compared with previous results published by Orban *et al.* [2] ranging from 0 to 43 eV. Figure 1 shows the measured merged beams rate coefficient and calculated DR resonance positions. For energies below 42 eV, the spectrum is dominated by  $\text{Si}^{10+}(2s^2) + e^- \rightarrow \text{Si}^{9+}(2s2p^2S+1P_J)n_j$  DR resonances. In addition, resonances associated with trielectronic recombination (TR)  $2s^2 + e^- \rightarrow 2p^2 n_j$  [3] are found. For energies between 100 and 300 eV, we observe DR resonances associated with  $2s^2 \rightarrow 2s3l$  excitations. The positions of resonances associated with  $2 \rightarrow 2$  and  $2 \rightarrow 3$  core excitations were estimated from theoretical excitation energies [4] and hydrogenic Rydberg binding energies for the captured electron. For energies above 1400 eV, resonances (labeled KLL, KLM, ... in figure 1) associated with K-shell excitations are observed. The corresponding DR resonance positions were calculated using the Los Alamos atomic physics program package based on the work of Cowan [5].

### References

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