Dielectronic Recombination of Be-like $^{40}Ar^{14+}$ at the CSRm

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Synopsis Absolute recombination rate coefficients of Be-like Ar^{14+} have been measured by employing the electron-ion merged-beams method at the cooler storage ring CSRm. All the resonances associated with dielectronic ($2s^2 \rightarrow 2s2p$) and trielectronic ($2s^2 \rightarrow 2p^2$) $\Delta N = 0$ recombination within the energy range of 0- 60 eV were studied.

Based on the successful DR measurement of Li-like $^{36}Ar^{15+}$at the cooler storage ring CSRm [1], total recombination rate coefficients of Be-like $^{40}Ar^{14+}$ has also been experimentally studied. Figure. 1 shows measured spectrum covering the relative energy between electron and ion from 0 to 60 eV in the center-of-mass frame. The resonant capture, involving the core excitation of an electron, is called dielectronic recombination. If the resonant recombination via a triply excited states, the core excitation involves two electrons, it is termed trielectronic recombination (TR), which was first observed in the of Be-like Cl^{13+} by Schnell et al [2]. Both DR and TR processes lead to series of peaks in the measured recombination spectrum, which have been identified by extending downward in energy from their series limits with the Rydberg formula.

For a better understanding of the measured spectrum, a theoretical calculation using the atomic-structure code AUTOSTRUCTURE [3] is in progress by the group of N. R. Badnell. We will present the details of the experimental results and the comparison between experimental data and the calculation results in this conference.

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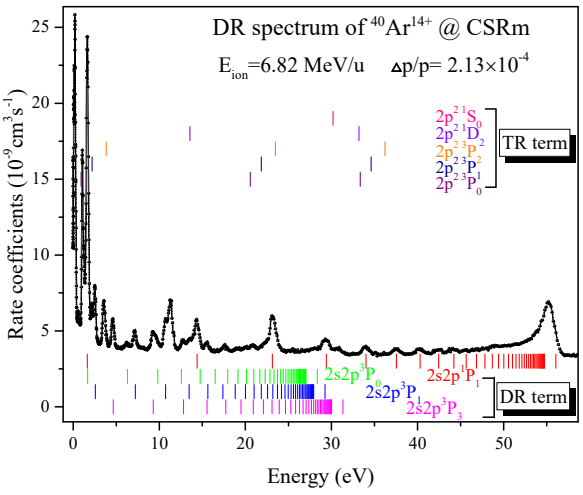

Figure 1. Measured recombination spectrum of Be-like $^{40}Ar^{14+}$ versus the relative energy between electron and the ion in the center-of-mass frame. Resonance positions based on the Rydberg formula are indicated by vertical short bar involving the spectrum for both dielectronic ($2s^2 \rightarrow 2s2p$) and trielectronic ($2s^2 \rightarrow 2p^2$) $\Delta N = 0$ recombination in different colors.

References

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