

Absolute measurement of dielectronic recombination rates at storage ring

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Dielectronic recombination (DR) is one of the most important atomic processes in various plasmas, which is relevant to the charge balance, radiative diagnostics, and energy transportation in the plasma evolution. Accurate DR rates as well as the plasma rates are crucial parameters in plasma modeling. However, measured absolute rates are scarce due to the experimental difficulties. DR measurements has developed into a high precision spectroscopy and furthermore, absolute DR rates for highly charged ions can be obtained at storage rings [1–3]. We have performed a series of DR experimental at the cooler storage ring CSR in Lanzhou China, for ions including Ar^{12+,13+,14+,15+}, Ca^{14+,16+,17+}, Ni¹⁹⁺ and Kr^{25+,30+} [4–13]. The typical DR spectrum of the Ar¹⁴⁺ ion and the plasma rate coefficients of different ions will be presented. A comparison between the plasma rates deduced from measured DR rates with the results of various theoretical models will be discussed. It is noticed that the electron–electron interactions in the multiple electron ion system should be considered appropriately in the models in order to explain the measured results.

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