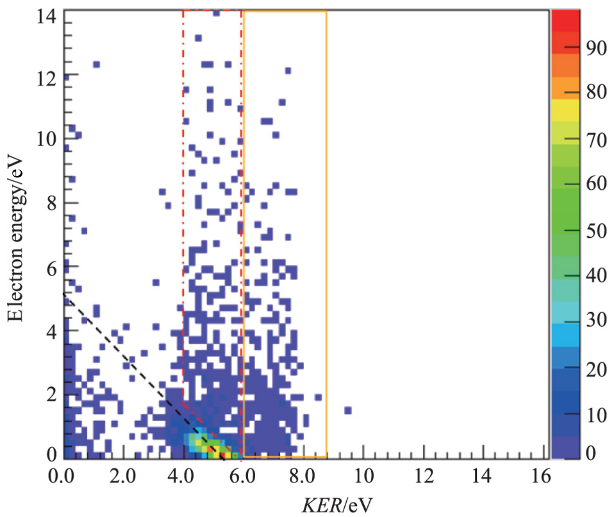

Fig. 1 (color online) Correlation map between electron energy and KER. Black dashed line: position of ICD initial states: Ne($2s^{-1}$)-Ne($2p^6$).

electron energy and the KER is presented in a two dimensional map, in which a diagonal island at electron energy from 0 to 2 eV and KER from 4 to 6 eV is observed.

According to the energy conservation law, if a $2s$ electron of one Ne atom is ionized, and the transition energy from $2p$ to $2s$ is used to ionize the electron of another Ne atom, the sum energy of ICD electron and KER will be a constant (5.5 eV). In Fig. 1, this constant is presented as a dashed line. Obviously, most events in the diagonals island locate around this line. This means that we detected ICD arises from initial states Ne($2s^{-1}$)-Ne($2p^6$). Because we do not apply the electron energy spectrum subtraction in the offline analysis, our result provides the most direct evidence of ICD in (e, 2e) experiment so far.

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3 - 9 Calculations about the Production Rate of H- and Li-like Uranium for DR Experiments on HIAF

Wang Shuxing[1], Wen Weiqiang[2], Huang Zhongkui[2], Wang Hanbing[2], Xuxin[1], Ma Xinwen[2] and Zhu Linfan[1]

([1]Department of Modern Physics, University of Science and Technology of China, Heifei 230026, China;
[2]Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China)

A new project, High Intensity heavy ion Accelerator Facility (HIAF) is under design now in China, which will provide stable and unstable ion beams with high energy, high intensity and high quality[1]. Dielectronic recombination (DR) experiments of very heavy highly charged ions and radioactive ions are considered as the main motivation for atomic physics at HIAF[2]. The spectroscopy of very heavy H- and Li-like ions is a powerful tool to test quantum electrodynamics (QED) in strong fields and to investigate the generalized Breit interaction (GBI)[3,4]. In addition, the isotope shift and the hyperfine splitting can be researched with DR experiments of Li-like ions.

In order to prepare the DR experiments with an electron-cooler and a dedicated electron target at SRing on HIAF, the calculations about the percentage and output energy of H-like $^{238}U^{91+}$ and Li-like $^{238}U^{89+}$, $^{235}U^{89+}$, $^{237}U^{89+}$ with program Lise++ have been performed by using $^{238}U^{34+}$ as a projectile. The results of the calculation are presented in Fig. 1. Therewith, the energy of electron-cooler and the required detuning voltage of the electron target corresponding to the ion beam energy and excitation energy of KLM-DR process of H-like $^{238}U^{91+}$ have also been calculated, respectively. The combination of an electron cooler and a dedicated electron target at the SRing will provide a unique opportunity for DR spectroscopy of highly charged ions to test the strong field QED and investigate the interface of atomic physics and nuclear physics.

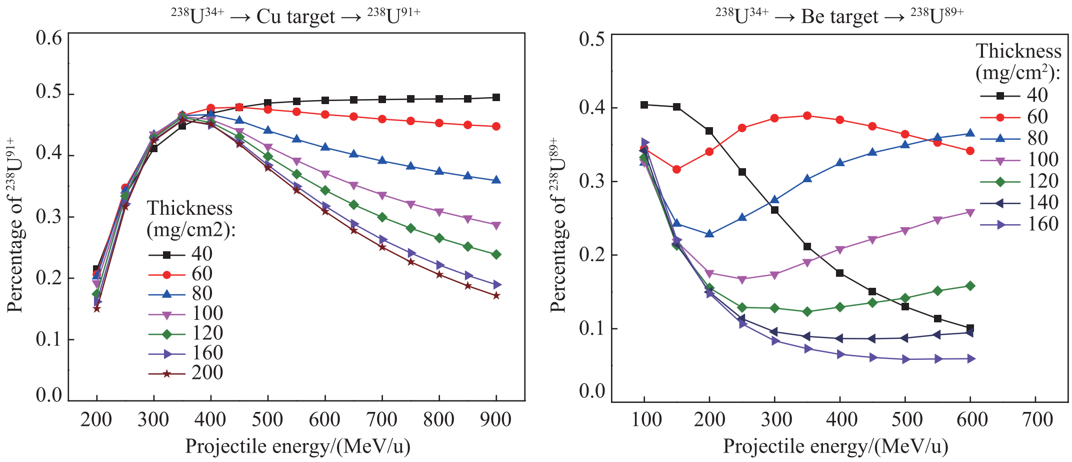

Fig. 1 (color online) Calculated production rate of H-like $^{238}U^{91+}$(Left) and Li-like $^{238}U^{89+}$(Right) utilizing $^{238}U^{34+}$ projectile in target materials of Cu and Be respectively, displayed as a function of the projectile energy.

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3 - 10 State-selective Spontaneous Evolution of Rydberg Atoms into an Ultracold Plasma*

Zaheer U. Syed[1,2], Li Yufan[1,2], Zhao Dongmei[1], Ma Xinwen[1] and Yang Jie[1]

([1]Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China;
[2]University Chinese Academy of Sciences, Beijing 100049, China)

We measured the state distribution of cold Rydberg atoms for various initially excited Rydberg levels and evolution times in order to investigate the collision-induced dynamics. The cold Rydberg atoms were excited into nP states (n = 20, 25, 30, ⋯, 97) below the ionization potential. Immediately after the excitation the hot electrons were detected as shown in Fig. 1(a), which are due to the slow ionization caused by the collision between hot Rydberg atoms and cold Rydberg atoms[1]. A pulsed electric field (~300 mV/cm) was applied after few microseconds and

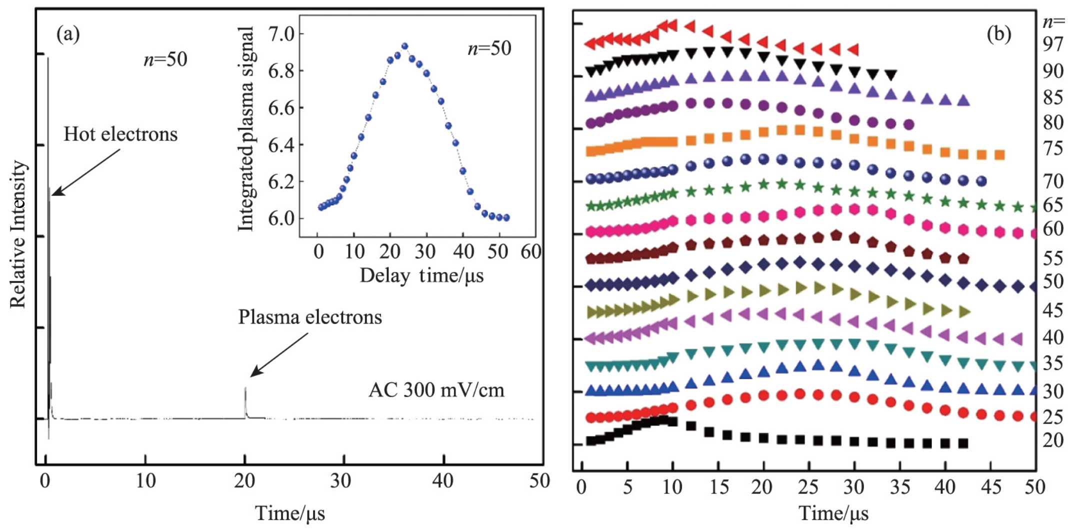

Fig. 1 (color online) (a) Electron signal for the evolution of Rydberg atoms into plasma, the inset indicates the integrated plasma signal, showing the lifetime of the plasma (b) the integrated plasma signals for different nP states.