4 - 1 Image of Emitted Electrons in Transfer Ionization in Proton-neon Collision at Intermediate Energy[1]

Feng Wentian, Ma Xinwen, Zhu Xiaolong, Zhang Shaofeng, Liu Huiping, Li Bin
Yan Shuncheng, Xu Shenyue, Zhang Ruitian, Zhang Pengju and Guo Dalong

The investigation of transfer ionization (TI) in intermediate ion atom collision is very important for understanding the many-particle quantum mechanics. However, the TI has been studies for more half a century, but the mechanisms of TI at intermediate impact energies are still controversial[1, 2] till now.

In this work, the velocity vectors of emitted electrons for TI in p-Ne at projectile velocity $V_p = 2$ a. u. are obtained using a reaction microscope[3] at Institute of Modern Physics, CAS. The emitted electrons of energies less than 55 eV could be completely collected. The projections of the velocity of the ejected electrons in the scattering plane (topview) and normal to the scattering plane (sideview)[4] are plotted in Fig. 1(a) and (b), respectively. Fig. 1(a) shows that the emitted electrons are found mainly around the target with the velocities nearly 0. In Fig. 1(b), the distribution of emitted electrons are similarity with the Fig. 1(a). It indicate that the spatial distribution of emitted electrons is spherical around target. These characteristics are signiciantly different from that observed in the TI of He^{2+}-He[1]. Several factors may be lead to the difference. Firstly, the V_p of p is higher than He^{2+}, the interaction time of p with target is shorter than He^{2+}. Then, p is neutral after capturing an electron, so the Post Collision Interaction (PCI) of H atom is weaker than He^+. And it is easier for Ne to lose two electrons at large impact parameter than He. However, the mechanism leading to the ejection of electrons is still not been understood. The further experimental data analysis is in progress.

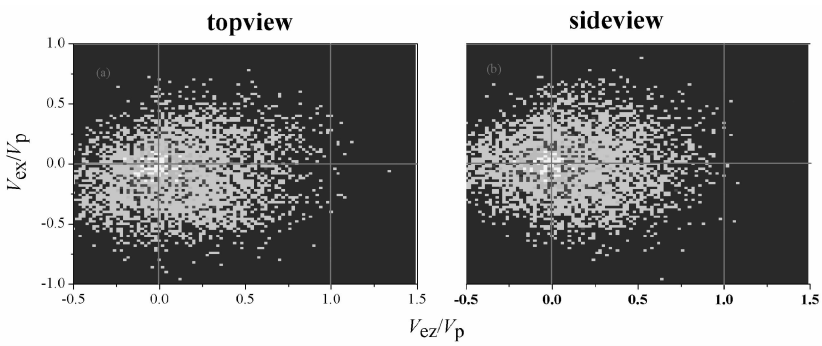

Fig. 1 The emitted electron velocity distributions in the scattering plane for TI in p -Ne collision at $V_p = 2$ a. u. topview (a) and sideview (b).

References

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