

# Absolute charge-exchange cross section measurement in heavy ion interaction with atom and molecule

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Cross section, being amongst the most important parameter in describing atomic collision processes, can point towards the relevant reaction mechanisms and also have been used as key physical quantities for checking many-body theories. On the other hand, cross sections for the interaction between ions and atoms play an important role in understanding astrophysical plasmas and fusion plasma diagnostics. However, due to the complicated collisional processes and high costs involved in experimental measurements, cross sections for highly charge ions interacting with atoms/molecules are still limited. In the near future, we plan systematic studies of the interactions between ions and atoms/molecules based on the highly charged ion collision platforms in Lanzhou and Shanghai. By measuring single and multiple electron capture absolute cross sections, we aim to determine electron capture cross sections as a function of impact energy. Using a reaction microscope, the three dimension momenta of the projectile ions, the recoil ions and the free electrons can be measured in multi-coincidence for the interaction of ions with atoms/molecules. Then both the transfer ionization cross sections and state-selective differential cross sections can be deduced. The systematic results expected from this project can help theorist to check the validity of their many-body theories and also can provide high accuracy atomic data for plasma physics.

The project will be performed in an international collaboration. They are:

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