

Correlation of Backscattered and Recoil Ions in Violent Ion-Atom Collisions by Coincident Rutherford Backscattering Spectrometry

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Abstract:

Charge state distributions in violent ion-atom collisions have been investigated using a novel combination of experimental techniques that is termed Coincident Rutherford Backscattering Spectrometry (CRBS). The CRBS combines the traditional Rutherford backscattering spectrometry (RBS) with the time-of-flight (TOF) coincidence and position-imaging techniques, in order to simultaneously determine the final charge states of both backscattered and recoil ions under single collision conditions. The use of coincidence technique can greatly enhance the information gained from the traditional RBS, and the novel CRBS measurements may shed light on the microscopic phenomena that dictate specific excitation processes, which, in turn, may lead to a better understanding of the macroscopic phenomena of energy loss and charge state evolution of ions traversing gaseous targets. To the best of our knowledge, this is the first attempt to perform such CRBS measurements.