

Fragmentation of dications studied by Auger electron-ion-ion coincidence experiments

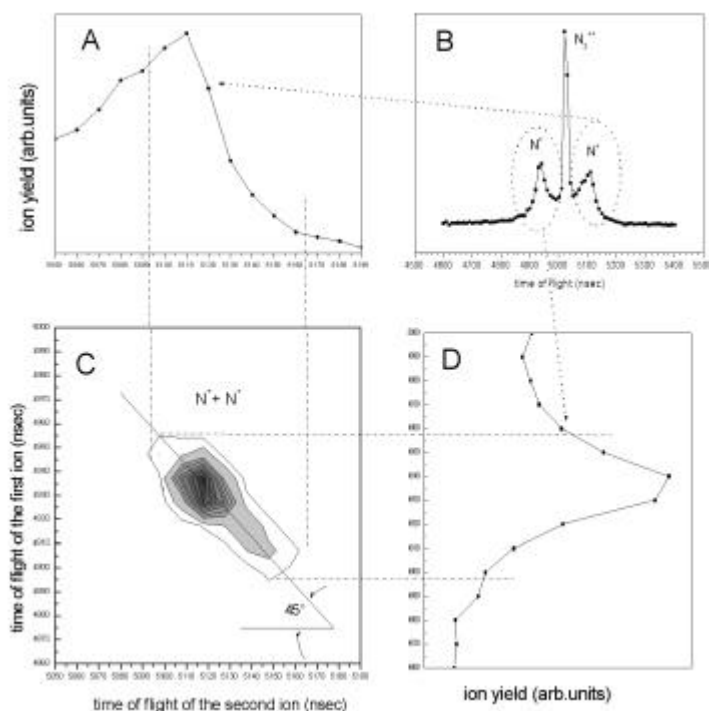
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An Auger electron-ion coincidence apparatus has been built at CNR-IMAI (Rome) to study the fragmentation of dications by electron impact [1]. The peculiarities of the technique are related i) to the possibility to make a state-to-state study of the fragmentation process and ii) to its site selectivity. Then the determination of the kinetic energy releases of the fragments provides information on the shape of the potential surface of the precursor state and the energy partitioning among the internal degrees of freedom of the fragments.

The main components of the spectrometer are a Wiley-McLaren TOF mass spectrometer and a cylindrical mirror analyzer. The coincidence spectra were obtained by using standard coincidence electronics based on a TDC. From the raw data the control software produces on-line the electron-ion coincidence spectra, while the electron-ion-ion coincidence spectra are obtained in the analysis off-line.



Auger electron-ion-ion triple coincidence experiment [C] relative to the N_2^{2+} binding energy of 50 eV. The coincidence TOF spectrum is shown in [B] and the portions of this spectrum which contribute to the triple coincidence map in [A] and [D]

Via the selection of the energy of the Auger electrons a state-to-state study of the fragmentation patterns in N_2 and CH_4 has been performed. In N_2 the triple coincidence experiment has allowed to identify a $1s^{-1}v^{-1} \rightarrow v^{-3}$ transition in the Auger spectrum. In CH_4 a progressive atomisation is observed as the binding energy of the dication increases.

References

- [1] E. Fainelli et al. J. Electron Spectrosc. Relat. Phenom. **119** (2001) 81

