

Atomic collisions using low and high energy ion beams at wider perturbation strengths

Various features molecular collisions under swift ion collisions are of recent interest for its application towards radiobiology, radio sensitization, astrochemistry of interstellar medium as well as fundamental quantum mechanical issues. Particular interest is the collective plasmon resonance (GDPR and GQPR) which is common thread among the PAH molecules, nano-particles, halouracils, nanosensitizers, fullerenes etc. A novel idea is demonstrated i.e. use of highly charged ions to observe the giant dipole plasmon resonance in PAHs and C60 as well as the giant quadrupole plasmon resonance (GQPR) for C60. The dramatic enhancement of the double and triple ionizations the DI-to-SI ratios for PAHs upon HCI impact are again related to the multi-electron-correlation induced plasmon excitation. The high energy x-rays and Auger electron spectroscopy can be applied in case of high energy ion-atom, ion-solid collisions in order to investigate the ionization of strongly bound K-shell electrons which is highly influenced by the strong field and relativistic effects. The high energy collisions are also most suitable situation to study the radiative electron capture or di-electronic recombination processes. The wider range of energies offered by various accelerators such as ANURIB or other related machines can be suitably used to explore various facets of atomic molecular physics be it outer shell or inner shell processes. The present measurements are carried out using fast HCIs of energy a few MeV/u as well as 100s keV/u obtained from the Pelletron and ECR-based ion accelerator at TIFR.

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