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Atomic collisions with large molecules and interdisciplinary sciences

By: Professor Lokesh C. Tribedi, TIFR Mumbai

At: 17:30, Wednesday, 19th February, 2025

In: LH2, Research & Academic Block, IISER Tirupati

@: [Zoom Link](#) OR Scan QR Code



ABOUT THE SPEAKER

Affiliation: Professor and Head of the Department, Department of Nuclear and Atomic physics, TIFR, Mumbai

Research Area: Atomic & Molecular Collisions

Awards: INSA Medal for Young-scientist; DST-Swarna Jayanti Fellowship; Goyal Young scientist Prize

ABSTRACT

Various features of atomic molecular physics can be conveniently investigated using fast-ions obtained from a low or high energy accelerators on a wider energy range of keV to MeV or even to GeV. Atomic collisions find many applications towards radiobiology, plasma physics, astrochemistry of interstellar medium as well as fundamental quantum mechanical issues. Particular interest is the collective plasmon resonance which is common thread among the different many body systems namely, fullerenes, PAH (polycyclic aromatic hydrocarbon) molecules, nano-particles, and nanosensitizers (for radiobiology).. Simple molecules like H₂ or N₂ can reveal the double-slit nature of the molecules giving rise the Young type e-interference due to spatial coherence. The e-emission cross sections from DNA/RNA bases and water, or radio-sensitizers like halo-uracils are important for the study of radiation damage in high energy proton therapy of cancer. Similarly, the recent studies on the ionization and multi-fragmentation, in particular the dehydrogenation of different PAH molecules are shown to provide valuable information towards the astro-chemistry of inter stellar medium, such as, the abundance of H₂ in ISM or astrophysical extinction curve. The elegant technique of using highly charged ions with large perturbation strength has been shown to be extremely useful probe to excite the dipole and quadrupole plasmon excitations in fullerenes or smaller PAH molecules. I will summarize some of our recent contributions towards these studies in TIFR using ECRIS and Pelletron accelerators.

REFERENCES

1. 'Recent advances in Atomic Molecular collisions' book Published by Springer (Singapore), ed. L. C Tribedi (2024)
2. Review/Roadmap article: L.C Tribedi : J Phys B 52 171003 (2019)
3. Review article: Chapter-3 in the Book 'Recent Developments in ion-atom and ion-molecule collisions: Experiment, theory and applications' Ed. Dzevad Delkic, World Scientific (Singapore)

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