

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

2A&B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

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Theoretical Physics Department

Title:	Slow Collisions of ions with H₂: State Selective Charge Transfer Cross Sections
Speaker:	Bidhan C. Saha, Department of Physics, Florida A & M University, USA
Date:	August 11, 2017 (Friday)
Time:	11:00 a.m.
Venue:	C.V. Raman Hall, 2nd Floor, Main Building, IACS
Abstract:	In a charge exchange reaction an electron or several electrons are captured from one atomic system to another. Low-energy charge exchange process between ions and molecules is a challenging problem; this is not only important for understanding the basic mechanisms but also for its critical roles in the formation and the decay of both astrophysical and laboratory plasmas. In addition, the state selective cross sections are essential in diagnostic laboratory plasmas and also in pumping atomic levels for laser actions. Atomic targets are rather simple to handle than their molecular counterpart, which includes additional degrees of freedom. Similar to atomic cases, the ion-molecule charge exchange collisions are also characterized by distant encounters in which the interactions remain localized to a limited range of the internuclear separation (R). By freezing the molecular details of the target one can approximate the target just like an atom with appropriate ionization potential. A multi-channel close coupling calculation based on a molecular expansion augmented with the plane-wave translation factor is carried out in which the number of molecular states to be coupled together is decided by the collision dynamics of the individual pair. The process of single electron capture from H₂ by a number of partially and fully stripped ions Aq^+ with charge $2 \leq q \leq 6$, $A^{q+} + H_2 \rightarrow A^{(q-1)+} + H_2^+$ will be discussed. Our calculated cross sections agree well with experimental results throughout the studied energy range.

All are cordially invited to attend the seminar