



## SEMINAR

by

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### TITLE

**Microscopic View of Fundamental (Time Honored) Problems of Physical Chemistry and Physical Biology**

### ABSTRACT

In Chemistry and Biology we often deal with complex systems (a terminology borrowed from physicists and mathematicians). Our most common solvent is water which shows multiple anomalies that are turning out to be quite difficult to understand. In the language of physics, water is an extremely complex system, with its disordered extended hydrogen bond network. [1] Not only transport properties of water are hard to understand, but also those of ions in aqueous solution. We shall discuss recent advances in our understanding of diffusion of polyatomic ions, like nitrate, acetate ions.[2,3] More complex are aqueous binary mixtures (like water-ethanol and water-DMSO) that are chemically and biologically important solvents and are also not well-understood. For example, these solvents are known to exhibit anomalies at certain composition ranges which influence solvation properties. [4] Hydrophobic interaction plays an important role in these systems, as also in protein folding. Water at the surface of biomolecules like protein and DNA also exhibit interesting properties. [5] We shall discuss the modern developments in these areas in a coherent fashion, with an attempt to bring out the unity among all the diversity in the diverse areas.

1. B Bagchi, "Water in Chemical and Biological Processes" (Cambridge, UK, 2013).
2. P. Banerjee and B. Bagchi, *J. Chem. Phys.*, 147, 124502 (2017); doi: 10.1063/1.4994631
3. P. Banerjee, S. Yashonath, and B. Bagchi, *J. Chem. Phys.*, 145, 234502 (2016); doi: 10.1063/1.4971864; *J. Chem. Phys.*, 146, 164502 (2017); doi: 10.1063/1.4981257.
4. M. Hazra and B. Bagchi, *JCP* (2017).
5. B. Bagchi, *J. Physics – Cond. Mat.* (2017)