



INSTITUTE SEMINAR

30.10.13

4.00 p.m.

Fermion

Speaker:

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Title:

Stochastic Dynamics in Condensed Matter-Neutron Scattering Study

Abstract:

Diffusing particle or reorientation of a molecular species is actually a stochastic process. Such a process over a time scale $ca\ 10^{-10} - 10^{-13}$ sec is conveniently studied using quasi-elastic neutron scattering (QENS) technique. It is particularly suited for studying the dynamics in hydrogenous materials (viz. organic, polymer, soft matter and biological systems etc.) as hydrogen has large scattering cross section. QENS offers a unique possibility of analyzing spatial dimensions of atomic or molecular processes in their development over time. The time-scale of the dynamical motion, its geometry as well as the nature of the hindering potential can all be obtained from the QENS measurements. We have studied various systems, for examples, atomic or molecular diffusion (translation and rotation) in crystalline systems, confinement of molecules in nano pores, like clay, zeolites, molecular sieves, metal organic framework etc; polymer based

membranes, molecular magnets; nano-metal clusters; dynamical landscapes in cationic and anionic micelles etc. Some of the recent results will be discussed.

References

- V. K. Sharma, S. Mitra and R. Mukhopadhyay, *J. Phys. Soc. Jpn.* **82** (2013) SA006
- S. Mitra, S. A. Prabhudesai, D Chakraborty, V. K. Sharma, M. Vicente, J.P. Embs and R. Mukhopadhyay, *Phys. Rev. E* **87** (2013) 062317
- V. K. Sharma, S. Mitra, M. Johnson and R. Mukhopadhyay, *J. Phys. Chem. B* **117** (2013) 6250.
- V. K. Sharma, S. Mitra, V.G. Sakai and R. Mukhopadhyay, *J. Phys. Chem. B* **116** (2012) 9007
- V.K. Sharma, S. Mitra, V.G. Sakai, P.A. Hassan, J. Peter Embs and R. Mukhopadhyay, *Soft Matter*, **8** (2012) 3151
- S. Mitra, V. K. Sharma, V. G. Sakai, J. Peter Embs and R. Mukhopadhyay, *J. Phys. Chem B*, **115** (2011) 9732.
- V. K. Sharma, S. Mitra, Amit Kumar, S. M.Yusuf, Fanni Juranyi and R. Mukhopadhyay, *J. Phys. Condensed Matter*. **23** (2011) 446002
- Siddharth Gautam, V. K. Sharma, S. Mitra, S. L. Chaplot and R. Mukhopadhyay, *Chem. Phys. Lett.* **501** (2011) 345.
- V. K. Sharma, Gunjan Verma, S. Gautam, P. A. Hassan, S. Mitra and R. Mukhopadhyay, *J. Phys. Chem. B* **114** (2010) 17049.
- V. K. Sharma, Gunjan Verma, S. Gautam, P. A. Hassan, S. Mitra and R. Mukhopadhyay, *Z. Phys. Chem.* **224**, 253-261 (2010)
- V.K. Sharma, S. Gautam, S. Mitra, Mala N. Rao, A. K. Tripathi, S. L. Chaplot and R. Mukhopadhyay, *J. Phys. Chem. B* **113** (2009) 8066.
- V.K. Sharma, P.S. Singh, S. Gautam, S. Mitra and R. Mukhopadhyay, *Chem. Phys. Lett.* **478** (2009) 56.
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