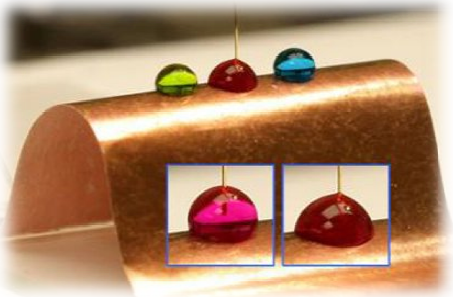

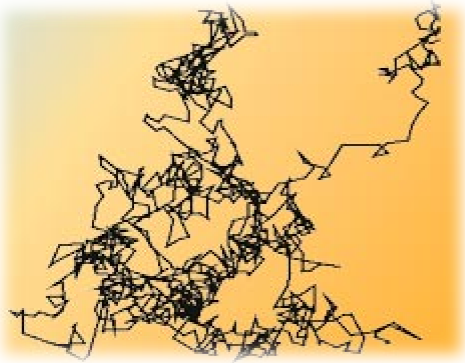

Refresher Course in Physics

Department of Physics, University of Pune

(UGC academic Staff College, University of Pune)

11 November to 1 December 2013

Soft Condensed Matter Physics

We experience many process in daily life that are related to Soft Condensed Matter physics. Less attention is paid towards many ubiquitous process related to Soft matter. Household products like dough, milk, creams,.... all fall under the realm of Soft" condensed matter. Not only dairy products, but cement, sand, putty, varnish, emulsions paint all are soft matters. The list is literally endless.

Dry sand can flow like a liquid however wet sand doesn't and could sustain a weight of a vehicle. Leaking tap in kitchen sink is the best example of non-linear flows and chaos. Notwithstanding to the ubiquity, less attention is paid to introduce this course to graduate and undergraduate students. But this subject is studied and researched in many institutes and Universities.

Why is it termed as "Soft" condensed matter? This refresher course is a leading step to introduce Soft Condensed Matter Physics to teachers from various institutes. Experts in this field will be delivering lectures and tutorials to introduce this subject at a more elementary level. This course also contains experimental demonstrations. Participants will get hands on experience to perform the simple experiments in Soft Condensed Matter. Some of the exciting experiments from basic physics are also introduced. This is a pedagogical course and intended to offer academic excitement to most of the teachers from undergraduate and University department.

Course structure:

1. Brownian motion: history and recent developments in Physics, Econo-Physics and Active Soft Matter.
2. Macroscopic surface properties of liquids and solids in contact with liquids.
3. Wetting and spreading of liquids on plane and rough solid surface.
4. Technique for the wetting on demand. Electrowetting, Thermo-wetting, Photo wetting, magneto-capillarity etc
5. Micro fluidics: From basic to Applications
6. Granular Matter
7. Colloidal particles and controlled assembly of the particles
8. Aggregation models: Diffusion Limited Aggregation (DLA), Surface and Interface growth and Characterizations
9. Random Sequential Adsorption (RSA) for the macro-molecule assembly on solids
10. Rheology of the Soft matter and cells.
11. Optical trap: Excellent tool in the active soft matter and biology

Tentative list of common experiments:

1. Surface tension of water by pendent drop
2. Surface Energy of a polymer films using contact angle Method
3. Brownian Motion: normal diffusion of PS particles in water.
4. Electrowetting on dielectric: Controlled wetting of water drop on dielectric surface under the external field.
5. Computer simulation of a Diffusion Limited Aggregation (DLA) cluster
6. Fractal dimension of deterministic fractals and natural fractals
7. Sand pile: avalanches in the granular assembly
8. Pattern formation in the confined flows
9. Millikan oil drop experiment
10. Ionization Potential of Ar using Frank and Hertz
11. Propagation of low frequency (50 Hz) EM wave through conducting media (non-magnetic and magnetic).
12. Thermionic emission from Tungsten filament.
13. Black Body Radiation.
14. Compton Scattering.
15. Electron Spin Resonance.

Soft Matter Physics at Physics Department (Core Research Group)

1. Dr. Arun G. Banpurkar (PU)
2. Dr. Abhay V. Limaye (PU)
3. Dr. (Mrs.) Gauri R. Kulkarni (PU)
4. Dr. B. Dey (PU)
5. Dr. Ahmed Sayeed (PU)
6. Dr. Sudipto Muhuri (PU)
7. Dr. Rahul Marathe (PU)

Total contact hours: 108

Duration 3 Week or 18 days (excluding Sunday)

Working Hours:

Lectures/ Tutorials: 10.00 AM to 1.00 PM

Lunch Timings; 1.00 Pm to 2.00 PM

Practical sessions: 2.00 PM to 6.00 PM

Course Coordinator

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