Phase Transitions and their Technological Applications

Overview

Functionalities and features related to first and second order transitions, particularly in solids, are becoming more and more relevant to applications in areas of gas-free and environment friendly refrigeration, sensor development, magnetic storage, and dissipation-free magnetic transport. In relation to these functionalities, research on caloric effects, shape memory, proximity shell-magnetism, and spintronics are picking up momentum. Phase transitions have never before been so close to being exploited for technological use as at present. Parallel to these developments, the updating and spreading of the knowledge on phase transitions are becoming even more important at all levels. Even the classification of phase transitions no longer fits to our needs and requires modifications for today's understanding of experimental data. It goes beyond the traditional classification of 'first' and 'second' order. It is therefore a right time to acquaint the budding researchers (Ph.D. students, final year Master's students) in the field of Physics, Chemistry and Materials Science to these new aspects of phase transitions and critical phenomena.

A course on Phase Transitions and their Technological Applications within the framework of Global Initiative for Academic Networks (GIAN) will be offered to provide a firm background on the known classical aspects of phase transitions and to introduce and provide further knowledge on the state of the art of the applications.

Dates and Modules	➢ **5 March 2018 to 19 March 2018** ➢ Types of phase transitions, Recognizing phase transitions in experiments, Modelling phase transitions, Martensitic transitions (displacive phase transitions), Glassy transitions, Exploiting phase transitions for applications
Who can attend	➢ Students at post-graduate level (MSc/MTech/PhD) in the subjects of Physics, Chemistry and Materials Science or Faculty from reputed academic institutions and technical institutions. ➢ Young scientists from national R & D laboratories ➢ Researchers, Engineers from Industries, Private R & D laboratories
Fees	Participants from abroad: US $ 200/- Participants from Industry and Private R&D Organizations: Rs. 10,000/- Participants from Government R&D institutions: Rs. 5000/- Faculty from Academic Institutions: Rs. 3000/- Students from Academic Institutions: Rs 1000/- Goa University Students/Faculty: Free The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty

Prof. Mehmet Acet is an experimental solid state physicist at University of Duisburg-Essen, Duisburg, Germany with main expertise related to thestructural and magnetic properties of materials. He began his career by working on phase transition in 3d metals, mainly involving phase transitions in metallic chromium. His research area extended to the study of moment-volume instabilities in the field of the 'Invar effect,' where he made major contributions including the establishment of the anti-Invar effect. He also worked on manganese based compounds such as Mn-based silicides, gemanides, oxides, Heuslers and antiperovskites. He has contributed to the discovery of large magnetocaloric effects as well as the discovery of shell-ferromagnetism which provides as a magnetic-field-proof,non-volatile magnetic memory.

Prof. Kaustubh R. Priolkar is a Professor at the Department of Physics, Goa University. His current area of interest is structure and physical property correlation in complex materials using X-ray Absorption Spectroscopy and Neutron Scattering. He has been working on understanding magneto-structural correlations in magnetic shape memory alloys and antiperovskites.

Prof. Ramesh V. Pai is a Professor at the Department of Physics, Goa University. His current area of research is in quantum phase transitions in bosonic systems. He has been working on understanding the phases and excitations in ultracold bosonic atoms using density matrix renormalization group technique as well as mean-field approximations.

Course Co-ordinator

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