Brief Summary of the One Week Short Term Course on "Current trends in condensed matter physics"

by **Sansar Chand**

During these last five days, we have generated a wealth of information and experience in this STC. The brief Summary is the followings:

Day 1 (25th Sep, 2020) Inaugural:

The short term course was inaugurated by Prof. L. K. Awasthi, Director, Dr. B. R. Ambedkar National Institute of Technology, Jalandhar and welcome

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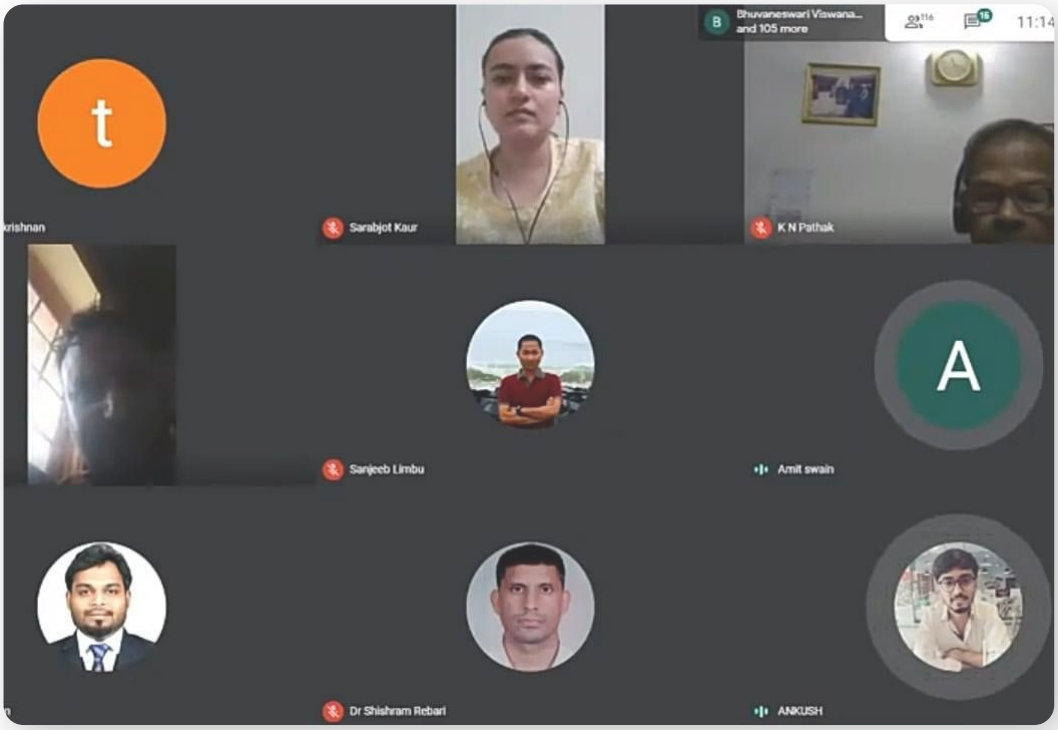
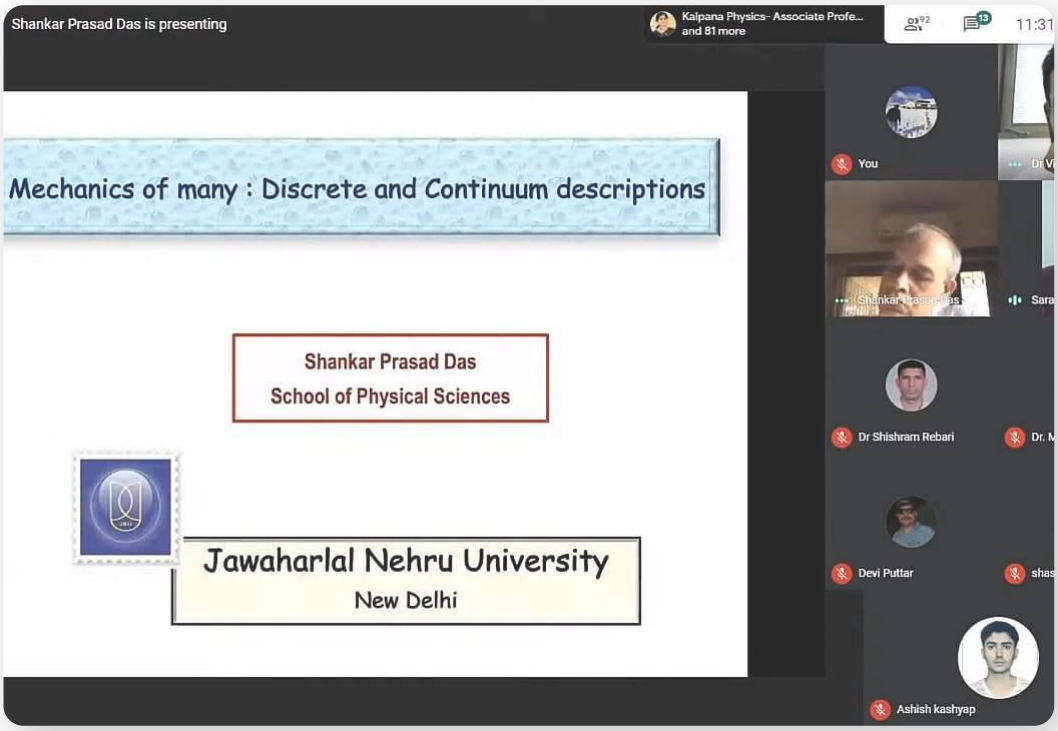
encouraged the participants and the organizers for attending and conducting the short term course (STC) online. The participants were welcomed by Dr. Harleen Dahiya, Head Department of Physics. Dr. Vinod Ashokan then briefed the participants about the objective and motivation for organizing the STC.

The course was registered by 763 participants including faculties, Postdocs, PhD students

and Master students from various leading academic and research

Gallery





Day - 4

Session – 7 (Morning)

Prof. Sumathi Rao (FNASc, Harish-chandra Research Institute (HRI)

Allahabad) delivered a talk on “Topological Phases of Quantum Matter”. She chronologically introduced the development of the field of topological phases in the last 10-15 years. She gave an overview of the basic ideas in this field, starting from the quantum Hall effect, and then leading to topological insulators, topological superconductors and Weyl semi-metals. She end with a brief mention of the current frontiers in the field.

Day - 4

Session – 8 (Evening)

Prof. Vikram Tripathi (Tata Institute of Fundamental Research, Mumbai) delivered a talk on "Spinons in magnetically ordered phase: on MBL Approach”. He discussed Quantum spin liquids, spin-1/2 honeycomb lattice Kitaev model etc. Then he discussed the realization of Kitaev physics in material systems, which has been proved quite challenging because of the presence of competing spin interactions that result in magnetic order. Prof Vikram presented some of his recent work in which to understand the nature of quasiparticles in a real Kitaev system, they have developed a new approach, based on the many-body localization ideas, of directly comparing the many-body states of a Kitaev-Heisenberg model with pure Kitaev states as well as magnon-like excitations of a spin-density wave. They have presented their main finding that over a range of strengths of the Heisenberg perturbation where spin-density wave order is present; the low-lying excitations resemble Kitaev states rather than magnons.

Day 4

Session 9 (Morning)

Prof. Sunita Shrivatava (Punjab University Chandigarh) , delivered a talk on “Properties of Topological Semimetal Lanthanum Monopnicitide” She summarizes the electronic structure topology of crystalline materials which has emerged as a major new theme in the modern condensed matter physics in the last decade.

She presented few results of her ongoing present research work, among them the first principles calculations have been carried out to study the structural, electronic and thermoelectric properties of LaBi by making use of density functional theory (DFT) combined with semiclassical