Public Relations Office
Jamia Millia Islamia

March 13, 2024

Press Release

JMI organizes 19th Abdus Salam Memorial Lecture 2024

The XIX Abdus Salam Memorial Lecture was organised by the Department of Physics, Jamia Millia Islamia (JMI) on March 6th, 2024 at Dr. M A Ansari Auditorium of the university. The lecture was delivered by Prof. Pinaki Majumdar, former Director of HarishChandra Research Institute, Prayagraj (Allahabad) and recipient of 2007 S S Bhatnagar award in Physics.

The Abdus Salam Memorial Lecture, held annually at the Department of Physics, JMI, tries to perpetuate the ideas that Salam believed in; namely the need for developing countries to encourage education and research in the fundamental sciences. An eminent person of science is invited each year to deliver this lecture. The style and content of the lectures are such as to inspire and to convey the excitement of new discoveries, ideas and challenges.

The title of Prof. Pinaki Majumdar's talk was 'Correlated Quantum Systems out of Equilibrium'. The lecture commenced with a welcome address by the Head, Department of Physics, JMI, Prof. M A H Ahsan. The Dean of Sciences, Prof. Tabrez Alam Khan gave a brief history and importance of Abdus Salam Memorial Lecture at JJMI.

The Vice Chancellor, Prof. Eqbal Hussain in his presidential remarks gave a brief biography and work of Prof. Abdus Salam. Prof. Eqbal Hussain recounted Prof Salam's visit to Aligarh Muslim University (AMU) in 1982 while he (Prof Eqbal Hussain) was a student at the Department of Physics, AMU.

The session concluded with a vote of thanks by former head of the department, Prof. Mohammad Zulfequar. In the afternoon, Prof. Pinaki Majumdar had an interactive session with students and faculty members in the Seminar room of the Department of Physics.

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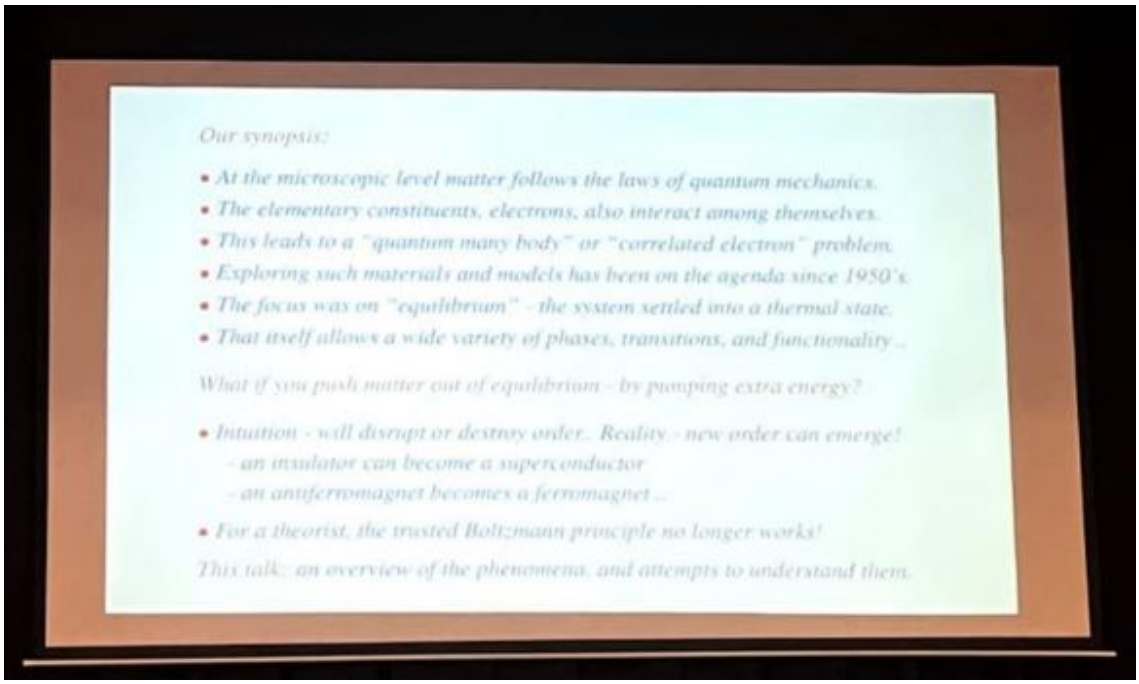
Correlated quantum systems out of equilibrium
Pinaki Majumdar
HRI Allahabad
Abdus Salam Memorial Lecture
Jamia Milia Islamia, March 2024


Our synopsis:
• At the microscopic level matter follows the laws of quantum mechanics.
• The elementary constituents, electrons, also interact among themselves.
• This leads to a "quantum many body" or "correlated electron" problem.
• Exploring such materials and models has been on the agenda since 1950's.
• The focus was on "equilibrium" - the system settled into a thermal state.
• That itself allows a wide variety of phases, transitions, and functionality ...
What if you push matter out of equilibrium – by pumping extra energy?
• Intuition - will disrupt or destroy order.. Reality - new order can emerge!
- an insulator can become a superconductor
- an antiferromagnet becomes a ferromagnet ...
• For a theorist, the trusted Boltzmann principle no longer works!
This talk: an overview of the phenomena, and attempts to understand them.

Public Lecture

Department of Physics

Jamia Millia Islamia

New Delhi

XIX Abdus Salam Memorial Lecture 2023-24

Correlated Quantum Systems Out of Equilibrium

by

Prof. Pinaki Majumdar

Former Director, Harish-Chandra Research Institute

Prayagraj (Allahabad).

Pinaki Majumdar did his Bachelor's in Electrical Engg. from Jadavpur University, a Master's in Solid State Technology from IIT Madras, and Ph.D in Theoretical Condensed Matter Physics from IISc Bangalore. He was a Post-Doc at Bell Laboratories, Murray Hill, NJ, for two years. He has been a faculty at HRI since 1998 and was Director from April 2017 to January 2024. He has been awarded the S. S. Bhatnagar award in 2007 and an Outstanding Research Investigator Award of the DAE Science Research Council. His interests are in correlated quantum systems.

Abstract: Correlated quantum systems, where the interaction between degrees of freedom is strong, define a frontier both in terms of theory and technology. The theory is challenging because there are a huge number of coupled variables, while applications are interesting because these materials host many possible "phases" close by in energy. The possibilities are even richer when one "drives" these systems - for example by using a strong voltage bias, or subjecting them to laser pulses. These problems force us to move beyond the Boltzmann principle of statistical mechanics and track the actual time evolution of these systems when subject to a drive. I will discuss the experimental scenario and briefly touch upon a couple of examples that we are trying to understand.

11:30 AM, Wednesday, March 6th, 2024

M A Ansari Auditorium, JMI

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