Harish-Chandra Research Institute

An Aided Institute of the Department of Atomic Energy, Govt. of India Jhunsi, Prayagraj

Infosys Lecture Series on Ultracold Programmable Quantum Matter

Speaker: Prof. Kaden Hazzard, Rice University, USA

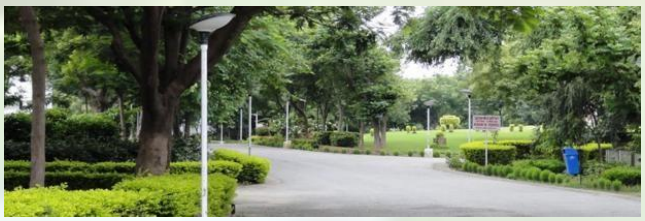
Date and Time: Feb 25 (5 PM), Feb 26, (11:30 AM), and Feb 27, (5 PM), and Mar 6 (4:30 PM)

Location: Higgs Hall

Physicists are using highly controllable quantum systems of ultracold atoms and molecules to explore quantum states of unprecedented complexity. These lectures will discuss these efforts and their underlying theory as well as insights they offer into quantum many-body physics.

The first two lectures will discuss how experiments with ultracold fermions in optical lattices are informing our understanding of strongly correlated matter, such as many phenomena encountered in high-temperature superconducting materials. I will review pertinent theory, and discuss our group's theoretical research on new ways to employ these platforms to investigate otherwise-inaccessible physics.

The next two lectures will discuss ultracold dipolar matter of ultracold molecules or Rydberg atoms. Here, the interplay of copious stable internal states and dipolar interactions provides exciting many-body physics. With a few internal states, these realize spin models such as Ising and Heisenberg models. With many states, one can create "synthetic dimensions", effective extra spatial dimensions with extreme tunability. I will describe recent progress, our evolving understanding of the many-body physics of these systems, and the open questions they pose.



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