THEORY LECTURE SERIES: What can ultracold SU(N) matter teach us about strongly correlated systems?

KADEN HAZZARD

June 10, 2025 to June 19, 2025
10:00 to 12:00
Blue Lecture Room and online (Teams)

ABSTRACT:

SU(N) symmetry appears throughout physics, from the standard model to solid-state materials. This large symmetry leads to a rich variety of new phenomena, including a vast array of symmetry broken states, excitations, and topological order. Remarkably, ultracold matter such as alkaline-earth atoms realize SU(N) symmetric systems with N tunable from N=2 to as large as 10 for strontium.

This lecture series will discuss what SU(N) symmetry is, how it arises in ultracold matter, and how ultracold SU(N)-symmetric matter can provide a new window into strongly correlated matter with insights unavailable from more common SU(2)-symmetric systems. I will introduce conceptual ideas and theoretical methods to understand exciting phenomena including Mott insulators, quantum magnetism, strange metals, and more. I will especially highlight the accomplishments of ultracold atom experiments and suggest where the field can impact major open questions of strongly correlated matter.

BIO:
Kaden Hazzard is an Associate Professor at Rice University, where he studies the theory of interacting quantum matter, especially in ultracold quantum systems. He studies experimentally-motivated problems in these systems, often motivated by connections to condensed matter and quantum information with a mix of analytic and numerical techniques. He also studied fundamental issues underpinning such systems, for example using mathematical physics techniques to understand the consequences of locality and -- recently -- constraints on particle statistics. He was elected as an APS Fellow (2023) for his work o ultracold matter

He studied at Ohio State (BS), Cornell (PhD, 2010), and did a postdoc a JILA/NIST/CU-Colorado before joining Rice University as faculty in 2014. Prof Hazzard als serves as the director of the Rice Quantum Initiative and Chair of the Graduate Program i the Department of Physics and Astronomy

DATES: June 10th, 12th, 13th and 19th

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