

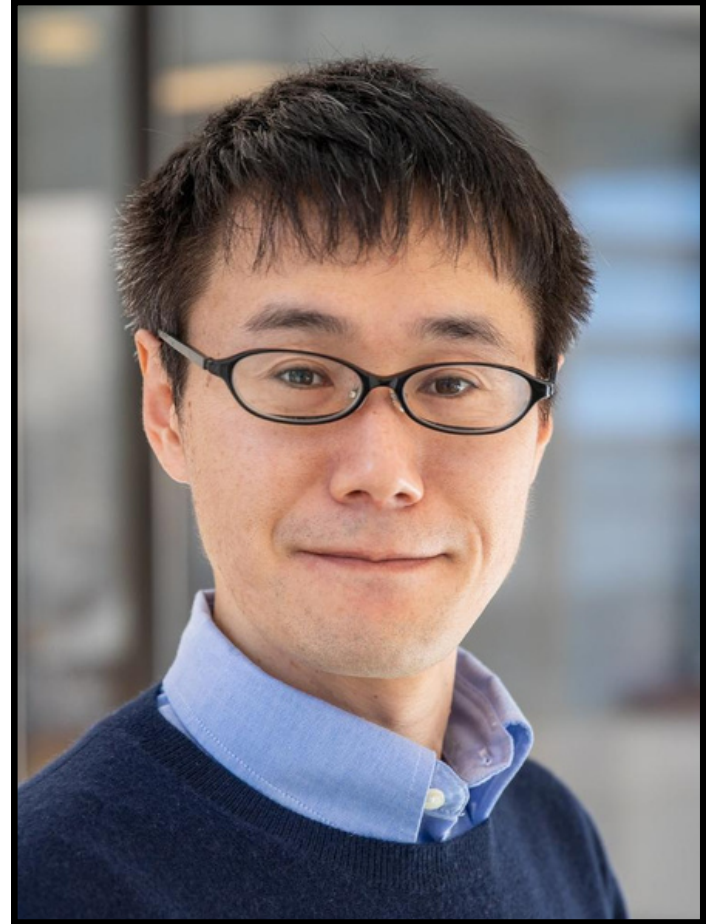
**Thursday, November 2, 2023**

Refreshments at 3:15pm outside PSF 101  
Colloquium from 3:30pm - 4:30pm in PSF 101

## **Many-Body Quantum Physics Through the Lens of Quantum Entanglement**

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### **Abstract:**

Understanding the emergent properties of complex many-body quantum systems is an ongoing challenge in various branches of physics, including condensed matter, nuclear, and high-energy physics. In this presentation, we explore the utility of quantum entanglement as a valuable tool for investigating strongly correlated quantum systems, with a particular focus on their topological and dynamical properties. Specifically, we discuss quantum correlations in topologically ordered phases in two spatial dimensions that go beyond what conventional bipartite entanglement entropy can reveal. Furthermore, we examine the broader applications of this approach, extending it to systems operating out of equilibrium. Our discussion sheds light on the remarkable potential of quantum entanglement as a versatile probe for unraveling the mysteries of complex quantum systems.

### **Biography:**

Professor Ryu received a BS in physics and an MS and PhD in applied physics, all from the University of Tokyo. He completed two postdoctoral appointments, the first at the Kavli Institute of Theoretical Physics at the University of California, Santa Barbara, and the second at the University of California, Berkeley. Professor Ryu was a faculty member at the University of Illinois at Urbana-Champaign and then at the University of Chicago before joining the faculty at Princeton University. Professor Ryu is broadly interested in theoretical condensed matter physics, in particular, quantum mechanical aspects of many-body systems. His past research highlights coherence, entanglement, and topology—unique features in quantum systems.