

# Theory Colloquium

Giuliano Giudici, University of Innsbruck

“Steering Rydberg atom arrays: from high-fidelity gate design to many-body state preparation”

## Abstract

Rydberg atom arrays offer a unique combination of capabilities for both quantum computing and quantum simulation. Unlocking their full potential requires precise control over their coherent dynamics, enabling fast and accurate gate operations and robust many-body state preparation. I will first discuss the design of high-fidelity entangling gates, tracing the path from early theoretical ideas to the current experimental state of the art and possible routes beyond it. I will then turn to the dynamical generation of strongly correlated many-body states, such as GHZ states and quantum spin liquids, showing how the same techniques used to optimize few-qubit operations can uncover new preparation schemes for interacting quantum systems.

Wednesday | 25.06.2025 | 5:00pm

SR 1 | ICT building