



Colloquium

"Manipulating and probing many-body quantum states - atom by atom"

Selim Jochim

Host: Julian Léonard

Starting from a highly degenerate Fermi gas of atoms, we distill quantum states of few atoms by exquisite control of the number of bound states in an optical tweezer potential. In this way we obtain close to pure quantum states of up to 42 atoms. While such systems have a lot of similarities with the electrons in an atom, or nucleons in a nucleus, the tunability of geometry and interactions, combined with versatile manipulation and detection capabilities offer unprecedented insights. For example, measuring all momenta or positions of the atoms in a spin resolved way allows us to determine correlations, such as those that define Cooper pairs. In our quest to gain better control and diagnostics, we are currently working on new manipulation techniques that respect the symmetry of our systems: As first steps, we learned how to manipulate angular momentum eigenstates, and could engineer correlated states of two atoms that are described by the Laughlin wave function. It is our vision to be able to measure and manipulate the motional state of each atom, including the angular momentum. As further progress is pushing the frontiers of our experimental capabilities, we have designed a new modular platform that allows to quickly exchange individual building blocks. Each module can be characterized and validated offline on a test bench. We will report our first experience with this new setup.

Tuesday, March 17, 2026 11:00am - 12:00pm

Office Building West/Ground Floor/Heinzel Seminar Room



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: <https://ista.ac.at/en/campus/how-to-get-here/> The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.