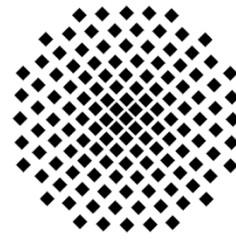


# Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart  
Max-Planck-Institut für Festkörperforschung  
Max-Planck-Institut für Intelligente Systeme

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Dienstag, 8. Mai 2018

17:15 Uhr

Hörsaal V 57.01

Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Hans-Peter Büchler, Universität Stuttgart, Telefon: 0711 - 685-64975

## Many-body physics with arrays of individual Rydberg atoms

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Institut d'Optique, CNRS Palaiseau

### Abstract

This talk will present our effort to control the interaction between cold Rydberg atoms in order to implement spin Hamiltonians that may be useful for quantum simulation of condensed matter problems. In our experiment, we trap individual atoms in two-dimensional arrays of optical tweezers separated by few micrometers and excite them to Rydberg states using lasers. We will present our demonstration of the coherent energy exchange between two Rydberg atoms resulting from their dipole-dipole interaction, and the implementation of the quantum Ising model in a system of 50 atoms with van der Waals Rydberg interaction. This demonstrates a new platform for quantum simulation using neutral atoms complementary to the ones based on ions, magnetic atoms or dipolar molecules.