Seminar

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Ultrafast many-body electron dynamics in an ultracold atomic BEC and Mott insulator lattice

Monday, October 21, 2019
at 11:00 h
ESI, Boltzman Lecture Hall

Abstract: Many-body correlations govern a variety of important quantum phenomena including the emergence of superconductivity and magnetism in condensed matter as well as chemical reactions in liquids. Understanding quantum many-body systems is thus one of the central goals of modern sciences and technologies. Here we demonstrate a new pathway towards this goal by generating a strongly correlated ultracold Rydberg gas with a broadband ultrashort laser pulse. We have applied our ultrafast and ultrahigh-precision coherent control with attosecond precision [1] to a strongly correlated Rydberg gas in an optical dipole trap, and have successfully observed and controlled its ultrafast electron dynamics [2-4]. This new approach is now applied to an atomic BEC and Mott insulator lattice to develop into a new platform for quantum simulation of strongly correlated quantum many-body dynamics on the ultrafast timescale [5,6].


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