Title:

Controlled Correlated Electron Dynamics and Quantum Radio

Abstract:

The establishment, observation, and potential control of correlated electron dynamics is a major challenge of significant interest across disciplines. In the context of atomic and molecular physics, these issues are relevant to a variety of complex problems, from femtosecond interatomic Coulomb decay and attosecond charge migration within small molecules, to energy transfer in photosynthetic systems, to quantum control of few- and many-body systems, and quantum simulation. My group is exploring the manipulation of correlated electron dynamics involving pairs of randomly distributed atoms in a dilute frozen gas. In an analogy to classical radio, we can use external controls to tune the natural oscillation frequencies of, and the coupling between, atoms that serve as sources and receivers. We have demonstrated the transfer of coherent electron motion from atoms to their neighbors, at distances of several microns. Future work may employ atoms in optical lattices to explore correlated, beyond nearest neighbor dynamics.

Bio:

Bob Jones received his Ph.D. in Physics from the University of Virginia in 1990, performing laser spectroscopy of correlated electrons in doubly-excited atomic autoionizing states, under the direction of Tom Gallagher. He then spent 3 years as a postdoctoral fellow with Phil Bucksbaum at the University of Michigan, studying the response of atoms to strong, ultrashort laser pulses and quantum control. He joined the University of Virginia faculty as an Assistant Professor in 1993 and is currently the Francis H. Smith Professor and Department Chair. His group explores the behavior of atoms and molecules in strong optical fields, and the observation and control of electron dynamics in isolated atoms and molecules and cold atom ensembles.