universität innsbruck

FWF Der Wissenschaftsfonds

Innsbruck Physics Colloquium

Quantum control of atoms, molecules
and their interaction

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Control refers to the ability to steer a dynamical system using external fields; quantum control does so by exploiting the wave nature of matter. One way to think of it is in terms of constructive and destructive interference between different quantum pathways, all connecting the same initial and final states. I will illustrate the concept of pathway interference using the photoionization of chiral molecules, i.e., molecules with a left-handed or right-handed nuclear scaffold, as example. An experimental realization of these theoretical proposals is hampered by present limitations on an accurate modelling of the molecular electronic structure. Atoms, in contrast, can be modeled very accurately, and we have shown recently that theoretically calculated pulses yield highly precise control in experiments with Rydberg atoms. The exquisite control over Rydberg atoms makes them a versatile component of the quantum control toolbox, and I will lay out the principles of Rydberg-atom enabled spectroscopy of polar molecules. Finally, I will touch upon the question to what extent the interaction between atoms and molecules can be controlled and highlight the role of resonances.

Colloquium: Tuesday, 10.05.2022
17:15 h, lecture hall A

DK-ALM Pre-Talk: 16:30 h, lecture hall A
Artem Rakcheev
Dynamics of a pair of magnetic dipoles with non-reciprocal interactions due to a moving conductor

Innsbruck Physics Colloquium, Organisation: M. Beyer, H.-C. Nägerl, A. Reimer

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