

EINLADUNG ZUM WIENER PHYSIKALISCHEN KOLLOQUIUM

TOWARDS COMPREHENSIVE CONTROL OF ATOMIC AND MOLECULAR MOTION

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The method of laser cooling has opened the door to low temperature physics of dilute gases. Despite the great success of this method, it has been limited to a very small set of atoms in the periodic table and no molecules. I will describe in this talk new approaches to trapping and cooling that have been developed in my group. The first step uses pulsed magnetic fields to stop atoms and molecules where they can be magnetically trapped. The next step is an experimental realization of informational cooling as first proposed by Leo Szilard in 1929 in an effort to resolve the paradox of Maxwell's demon. Together, these provide a two-step comprehensive solution to trapping and cooling.

I will describe our progress in applying these new methods to trapping and cooling of hydrogen isotopes. In the short term, we are working to trap hydrogen and deuterium, which will serve as a step towards trapping of atomic tritium. This system will be used for precision measurement of beta decay towards determination of the neutrino rest mass. Our methods are also very applicable to trapping and cooling of anti-hydrogen, and a collaboration at an accelerator laboratory is being pursued.

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