Trapping and Cooling of Hydrogen Isotopes

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Abstract

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 small set of atoms in the periodic table. I will describe in this talk new approaches to trapping of atoms and molecules that do not require lasers and are hence applicable to most atoms. I will then describe how the trapped atoms can be further cooled in an experimental realization of Maxwell's demon. 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 electron neutrino rest mass.