

QUANTUM OPTICS SEMINAR



Title: An optical frequency standard with laser-cooled magnesium atoms

Speaker: Jan Friebe
Hannover, Germany

Time: Friday, June 25 at 14:15

Place: 1525-323

Abstract:

Magnesium belongs to the small group of elements that are suitable for a high precision optical frequency or time standard. It displays the interesting feature that the blackbody radiation shift of the clock transition is the lowest for all earth-alkaline metals and is, e.g., 10 times smaller compared to strontium.

Recently, we have measured the frequency of the clock transition $(3s^2) 1S_0 \rightarrow (3s3p) 3P_1$ on a thermal atomic beam apparatus with an accuracy on the level of 10^{-12} .

A significant increase in accuracy was achieved in the following by the use of atoms in a magneto-optical trap in the singlet system. This talk focuses on this new frequency measurement with an ensemble of cold free falling atoms and the characterization of the stability of this system via a commercial telecommunication fiber link. By means of a phase coherent light transfer from Hannover to Braunschweig we compared our frequency standard with highly stable and accurate frequency references of Physikalisch-Technische Bundesanstalt. In this way we were able to reduce the uncertainty of our clock transition by a factor of 30.

From these measurements we could also derive the frequency of the strongly forbidden $(3s^2) 1S_0 \rightarrow (3s3p) 3P_0$ intercombination transition which will be of interest as a clock transition for a future lattice clock.

Jan Arlt

Coffee, tea and cake from 14:00