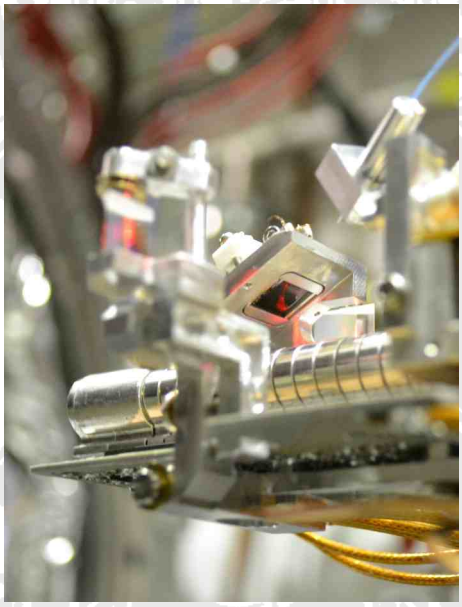
UNI FREIBURG
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg
Physikalisches Institut

PHYSIKALISCHES KOLLOQUIUM

AM 19. MAI 2014 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



The Short Past, Challenging Present, and Ambitious Future of Experiments on Antihydrogen at CERN

DR. MICHAEL DOSER

CERN

Experimental studies of Antihydrogen have a short history, but an ambitious future: a first generation of experiments which produced large numbers of antihydrogen atoms for the first time in 2002 has given place to a second wave of experiments which have just now (2012) managed to trap and carry out the first steps of measuring the properties of antihydrogen atoms. The goal of these experiments is to carry out comparative precision spectroscopy between Hydrogen and Antihydrogen, in view of testing the CPT theorem, either through 1S-2S spectroscopy, or via a measurement of the hyperfine splitting of the ground state of antihydrogen. A related class of experiments, among them the AEGIS experiment, combines techniques from these experiments with techniques from spectroscopic studies of Positronium produced in nanoporous materials and advances in other fields to study the gravitational behavior of antimatter. An overview of the challenges, limitations and perspectives of these, and results from related experiments will be presented, and an outlook for the next several years will be given. A particular emphasis will be placed on the AEGIS experiment, which in a first step aims to reach a 1% precision on the gravitational interaction of antihydrogen by measuring its free fall over the parabolic trajectory of a horizontally moving beam of antihydrogen atoms. If time permits, a short overview of the status of an experiment using antiprotons at CERN's antiproton decelerator to probe the possibility of using them for tumor therapy will also be given.