University of Stuttgart
Institute for Theoretical Physics III

SIRPOL Seminar

Monday
October 22, 2018
14:00 h
NWZ II,
Pfaffenwaldring 57
Room 5.331

Franziska Maier
(Johannes Kepler Universität, Linz, Österreich)

Laser Spectroscopy of Short Lived Radionuclides in an Ion Trap: MIRACLS' proof-of-principle experiment and the simulation of its future 30 keV MR-ToF device

Due to its high precision, accuracy and resolution, Collinear Laser Spectroscopy (CLS) is a powerful experimental technique to access nuclear spins, electromagnetic moments and mean square charge radii of short-lived nuclides far from stability and to obtain knowledge about the shell structure of exotic nuclides.

This talk will introduce the novel concept of a Multi Ion Reflection Apparatus for Collinear Laser Spectroscopy of radionuclides (MIRACLS). At MIRACLS, a fast ion beam with a kinetic energy of over 30 keV is trapped between the two electrostatic mirrors of an Electrostatic Ion Beam Trap (EIBT). Hence, the laser interacts with the ion bunch during each revolution inside the EIBT, therefore increasing the observation time. Compared to conventional CLS, this approach enhances the experimental sensitivity by a factor of 30-600 which will allow one to study the most exotic radionuclides available at today's radioactive ion beam facilities in the near future.

A proof-of-principle experiment based on a low energy EIBT (operating at 1.3 keV) is currently carried out at the on-line isotope separator ISOLDE at CERN to demonstrate the functionality of the novel MIRACLS concept. The first results of this work will be presented in this talk. Moreover, the simulations of the ion trajectories inside the future 30 keV EIBT and their implications for CLS will be discussed.

Institute for Theoretical Physics