

EINLADUNG ZUM WIENER PHYSIKALISCHEN KOLLOQUIUM

BETA DECAY AND STELLAR NUCLEOSYNTHESIS

Fritz BOSCH

GSI Helmholtzzentrum für Schwerionenforschung
Darmstadt

The synthesis of nuclides heavier than iron proceeds in hot stellar plasmas by a subtle interplay of beta decay and the capture of neutrons or protons. One of the major tasks of nuclear astrophysics is to redraw these pathways of stellar nucleosynthesis by providing unstable nuclides and by experimentally determining their main properties, the mass and the (beta) lifetime. However, in the hot stellar plasmas the nuclides are highly ionized which can lead to significant or even dramatic changes of beta lifetimes with respect to neutral atoms. The ion storage-cooler ring at GSI in Darmstadt, coupled to a synchrotron and a fragment separator, is still the only facility where beta decays of highly-charged nuclides could be investigated. Four selected examples of those experiments will be presented, including their impact for our understanding of the s- and r-processes of nucleosynthesis: a) the first observation of bound-state beta decay at the example of bare ^{163}Dy ; b) the dramatic change of the life-time of the "cosmic clock" ^{187}Re when all bound electrons are removed; c) the first determination of the ratio of bound- and continuum beta decay at the example of bare ^{207}Tl , and d) the first measurements of orbital electron capture decays of hydrogen- and helium-like nuclides for the examples of ^{140}Pr and ^{142}Pm .

Montag, 27. April 2009, 17:30 Uhr
(ab 17:00 Uhr Kaffee)

Universität Wien, Lise Meitner Hörsaal
Strudlhofgasse 4/1. Stock, 1090 Wien