ÖAW
Österreichische Akademie der Wissenschaften

INVITATION

HEPHY-SMI seminar on fundamental interactions and symmetries

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High Precision Mass Measurements of Rare Isotopes for Tests of Fundamental Symmetries

ABSTRACT:

To date, V_{ud} of the Cabibbo-Kobayashi-Maskawa quark mixing matrix is most precisely determined from superallowed nuclear ß-decays. In addition to half-life, branching ratio, and transition energy (called Q-value) of a superallowed decay, theoretical corrections have to be considered to extract V_{ud}. Among those, the isospin symmetry breaking corrections, δ_C, show discrepancies between different theoretical models, which are critical to be resolved. ^{74}Rb has the largest δ_C of all 13 superallowed ß-emitters used to obtain V_{ud} and would carry particular weight to discriminate between models were it not limited by the uncertainty in the Q-value. However, ^{74}Rb's half-life of 65 ms has previously posed a real challenge to the experimental precision in its Q-value, which is best determined by direct mass measurements in Penning traps.

This talk will describe Penning trap mass measurements of short-lived nuclides which were performed for the first time with highly-charged ions, using the TITAN facility at TRIUMF. Compared to singly-charged ions, this provides an improvement in experimental precision that scales with the charge state q and, hence, opens the door to unrivalled precision. The method is particularly suited for short-lived nuclides such as ^{74}Rb and its mass has been determined.

The talk will be concluded with a summary of TITAN's general program for fundamental symmetry studies. This includes recent mass measurements related to neutrino physics and a novel method of in-trap decay spectroscopy for the determination of nuclear matrix elements of 2vßß-decays.

DATE:

Wednesday, 06.06.2012 - 17:00 s.t.

VENUE:

Stefan Meyer Institute
for subatomic Physics
1090 Wien, Boltzmanngasse 3
Seminarraum 2.08

http://www.smi.oeaw.ac.at/groups/hephysmiseminar/

Stefan-Meyer-Institut
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HEPHY
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