



Contribution ID: 160

Type: Poster

The bound beta decay of the free neutron (BOB) - a unique tool to study the weak interaction at low energies

Tuesday, 22 October 2019 18:03 (1 minute)

Karina Bernert, Roman Gernhäuser, Stefan Huber, Igor Konorov, Bastian Märkisch, Stephan Paul, Christoph Roick, Heiko Saul, Wolfgang Schott, Suzana Spasova - Physik-Department, Technische Universität München, D-85748 Garching, Germany;

Ralf Engels - Institut für Kernphysik, Forschungszentrum Jülich, D-52425 Jülich, Germany

In order to improve the non- Standard Model weak interaction scalar and tensor coupling upper limits by an order of magnitude and to determine the helicity of an antineutrino combined with a low velocity charged lepton, the free neutron bound beta decay ($n \rightarrow H + \bar{\nu}_e$) (BOB) shall be measured. Thereby, monoenergetic metastable BOB H atoms ($T \sim 326$ eV) with a single hyperfine state, selected by a spin filter, generated at the center of a high flux beam reactor throughgoing beam tube (for example at the PIK reactor, Gatchina), are transformed with high efficiency ($> 10\%$) into H^- ions within an Ar cell. After extraction from the beam tube by means of a pulsed electric deflector, the H^- are measured by a velocity filter based on the Bradbury Nielsen Gate technology and an MCP detector. Although the bound beta decay branching ratio is small ($4 \cdot 10^{-6}$), the experiment seems feasible. Necessary experimental components, as a Bradbury Nielsen (BN) gate velocity filter, a pulsed electric deflector and an electrical quadrupole doublet have been developed, built and tested using low energy proton and oxygen beams. As an application for the BN gate chopper, the secondary electron yield from protons passing thin carbon foils has been measured.

Primary author: Dr GUTSMIEDL, Erwin (Senior Scientist Physics Department E18 TUM)

Presenter: Dr GUTSMIEDL, Erwin (Senior Scientist Physics Department E18 TUM)

Session Classification: BBQ - Drinks & Posters