HK 39: Astroparticle Physics

Time: Tuesday 16:30–18:30 Location: H-ZO 70

Invited Group Report HK 39.1 Tu 16:30 H-ZO 70

Nuclear physics aspects of double beta decay — •Jouni Suhonen — Department of Physics, University of Jyväskylä, P.O. Box 35 (YFL), FIN-40014, Jyväskylä, Finland

Since the verification of the existence of the neutrino mass by the neutrino-oscillation experiments the decay processes related to detection of the absolute mass scale of the neutrino and the neutrino mass hierarchy have become increasingly important subjects of study both in neutrino physics and nuclear physics. The most intriguing of these processes is the nuclear double beta decay which not only can access the absolute mass scale and the hierarchy of the neutrinos but can also reveal if the neutrino is its own antiparticle, a so-called Majorana neutrino. Nuclear-structure calculations are in the focus of this search for a precise value of the neutrino mass.

HK 39.2 Tu 17:00 H-ZO 70

High resolution (^{3}He,t) reaction on ^{100}Mo and implications to double β decay — •Pia Heinrichs, Dieter Frekers, Eike W. Grewe, Peter Puppe, Tim Ruhe, and Jan H. Thies — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster

A high-resolution ^{100}Mo(^{3}He,t)^{100}Tc measurement was performed at RCNP in Osaka (Japan) using the ^{3}He beam at an incident energy of 420 MeV and the high resolution WS course beam-line. An energy resolution of 29 keV was achieved. The measured data were used to extract the GT$^-$ strength in ^{100}Tc.

We observe that almost the entire low-energy (¡ 6 MeV) GT$^-$ strength is concentrated in the ground state. This has implications on the matrix element of the $2\nu\beta\beta$ decay of ^{100}Mo which will be discussed. In addition, the fact that the B(GT$^-$) strength is concentrated in the ground state allows one to consider ^{100}Mo as a detector for supernova and solar neutrinos, where such a detector (like NEMO-3 or MOON) may even be sensitive to the neutrino spectrum, resp. neutrino temperature. At high energies we find a double peaked Gamow-Teller Giant Resonance ($GTGR$) structure, which exhausts $\sim$ 50% of the Ikeda sum rule.

HK 39.3 Tu 17:15 H-ZO 70

A photelectron-gun for the investigation of MAC-E filters — •Marcus Beck[1], Kathrin Valerius[1], Christian Weinheimer[1], Sebastian Streubel[1], Henrik Arlinghaus[1], Hendrik Hein[1], Hans-Werner Ortjohann[1], Helmut Baumeister[1], Miroslav Zboril[1], Beatrix Ostrick[1,2], and Jochen Bonn[2] — [1]Institut für Kernphysik, WWU Münster, Wilhelm-Klemm Str. 9, 48149 Münster — [2]Institut für Physik, Johannes Gutenberg-Universität Mainz, Staudingerweg 7, 55128 Mainz

The KATRIN experiment will measure the energy spectrum of electrons from the beta decay of Tritium close to its endpoint to search for the mass of the electron neutrino down to $0.2eV/c^2$. For the energy analysis a MAC-E type filter is used. In order to investigate transmission and response of this filter we developed a pulsed, monoenergetic single electron source based on photoelectrons created with modern UV-LEDs. The emission of these electrons can be restricted to small angle intervals. This electron gun opens up the possibility to investigate the properties of MAC-E filters via time-of-flight studies and for defined emission angles.

We will present the experimental principle and results of measurements at the MAC-E filter at the former Mainz neutrino mass experiment, including a time-of-flight measurement of the transmission function.

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HK 39.4 Tu 17:30 H-ZO 70

Solid ^{83}Rb/^{83m}Kr source for the KATRIN experiment — •Miroslav Zbořil[1,3], Marcus Beck[1], Jochen Bonn[2], Otokar Dragoun[3], Jaromír Kašpar[3], Alojz Kovalík[5], Beatrix Ostrick[1,2], Ernst-Wilhelm Otten[2], Klaus Schlösser[4], Antonín Špalek[3], Thomas Thümmler[4], Drahoslav Vénos[3], and Christian Weinheimer[1] for the KATRIN-Collaboration — [1]IKP, WWU Münster — [2]IP, Mainz — [3]NPI ASCR, Řež/Prague, Czech Republic — [4]IK, FZK Karlsruhe — [5]DLNP, JINR Dubna, Russia

KATRIN investigates the endpoint region of the T_2-β-spectrum aiming for a sensitivity on the neutrino mass of 0.2 eV (90% C.L.). A spectrometer of the MAC-E filter type will be used for a total time of at least 5 years. An unrecognized shift of the filtering potential would influence the resulting neutrino mass. To continuously monitor the filtering potential the high voltage will be simultaneously applied to an additional MAC-E filter spectrometer. In this monitor spectrometer suitable electron sources based on atomic/nuclear standards will be utilised. As one of such monitoring tools the solid ^{83}Rb/^{83m}Kr source is intended. It provides conversion electrons from ^{83m}Kr which is continuously generated by ^{83}Rb. The monitoring task demands a long-term energy stability $\Delta E/E$ of the K-32 conversion electron line ($E = 17.8$ keV, $\Gamma = 2.8$ eV) of 3 ppm. The main features of the source and the results of the K-32 long-term stability test measurements at the Mainz MAC-E filter will be presented. This work is supported by DFG (BO1212/5-1 and BO1212/6-1), BMBF (05A08PM1) and Czech Science Foundation (LA318 and LC07050).

HK 39.5 Tu 17:45 H-ZO 70

A dedicated system for monitoring the tritium source in KATRIN — •Alan Poon for the KATRIN-Collaboration — Karlsruhe Institute of Technology, KCETA, Karlsruhe, Germany — Lawrence Berkeley National Laboratory, Berkeley, California, USA

KATRIN is a next-generation tritium beta decay experiment with a neutrino mass sensitivity of 0.2 eV. The tritium source is confined in a windowless cylindrical containment, and the source's "thickness", or "column density" is one of the dominant systematic errors in the experiment. This column density has a direct impact on the transmission of electrons from the source to the spectrometer. A system consists of an electron gun for testing the electron transmission and a detector system for determining the electron flux in the tritium source is being developed. In this talk, this system to be installed in the rear of the tritium source will be described.

HK 39.6 Tu 18:00 H-ZO 70

Das Reaktorneutrinoexperiment Double Chooz — •Daniel Greiner für die Double Chooz-Kollaboration — Kepler-Zentrum, Universität Tübingen, Deutschland

Eine lange Reihe erfolgreicher Experimente hat das Auftreten von Neutrinooszillationen bestätigt und nachgewiesen, dass zwei der sie beschreibenden Mischungswinkel groß sind. Für den dritten Mischungswinkel, Θ_{13}, ist vor allem aus dem Chooz-Experiment bisher nur eine Obergrenze bekannt. Die Größe von Θ_{13} ist somit eine der fundamentalsten momentan offenen Fragen in der Neutrinophysik und nimmt eine Schlüsselstellung für die Planung weiterführender Experimente ein.

Durch die Reduktion von statistischem und systematischem Fehler im Vergleich zum erwähnten ursprünglichen Chooz-Experiment sowie dem Einsatz zweier möglichst identischer Detektoren in unterschiedlichen Entfernungen von den Kernen des Chooz-B-Kernreaktors zielt das im Aufbau befindliche Double Chooz-Experiment auf eine Verbesserung der Sensitivität für $\sin^2(2\Theta_{13})2$ auf etwa 0,03 bei 90% C.L. ab, um Θ_{13} zu messen oder zumindest die Obergrenze deutlich abzusenken. Ende 2009 soll die etwa fünfjährige Datennahme mit dem zuerst fertig gestellten fernen Detektor beginnen.

HK 39.7 Tu 18:15 H-ZO 70

k-suryon effect — •Siva Prasad Kodukula — Qurter No.133-F;Sector-10;Ukkunagaram,Visakhapatnam,I N D I A,Pin-531163

When an electromagnetic radiation of *m* hertz*s Passes through an electromagnetic field created by a coil having a voltage of *V* volts and resistance of *R* ohms will be reduced to *n* hertz*s. Related by an equation m - n = K(V/R) where *K* = 5.922591x10ˆ-5 ohms / volt-sec. Here *K* is *K-Suryon Constant* derived by *K-Suryon Effect*. This reduction in the frequency is explained as the conversion of frequency in to mass surrounded by gravity field. Here the wave length will not be changed since the total energy of the wave is constant. This phenomenon is applicable in specified limits called elastic limit of the wave. A preliminary experimental set up has been suggested to prove this effect . Thus the experiment will explains the exchange of forces between gravity and electromagnetism through *K-Suryon Theory* . The *K-Suryon* is the most elementary particle