investigated (γ,n), (γ,p) and (γ,α) reactions for the medium-mass p-nuclei ^{92}Mo and ^{144}Sm, as well as (γ,n) reactions for ^{100}Mo and ^{154}Sm by photo-activation. The lowest photoactivation yields have been measured in an underground laboratory. The photodisintegration of ^{197}Au serves as a benchmark and it is compared to data measured previously with the positron annihilation technique.

HK 28.6 Tu 15:45 H-ZO 60

First direct mass measurement of the proton rich nuclides ^{85,86,87}Mo and ^{87}Tc — •Emma Haettner for the SHIPTRAP-Collaboration — Justus-Liebig Universität, Gießen — GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt

The masses of proton rich nuclides in the vicinity of $N = Z = 43$ were measured with the Penning trap mass spectrometer SHIPTRAP at GSI. These nuclei were produced in the fusion-evaporation reaction ^{36}Ar+^{54}Fe at energies of 5.0 and 5.9 MeV/u and separated at the velocity filter SHIP. The data are of astrophysical interest since these nuclei are believed to be a part of the rp and νp process paths.

The masses of ^{85}Mo and ^{87}Tc were measured for the first time. The masses of another two nuclides, ^{86,87}Mo, were determined for the first time in a direct mass measurement. For these nuclides the mass excess deviates from values of the 2003 Atomic Mass Evaluation by up to 1.5 MeV, indicating a systematic shift of the mass surface in this region of the nuclear chart. Additionally, the masses of ^{86}Zr and ^{85}Nb were measured and found to be in agreement with the values obtained at JYFLTRAP. The experiment as well as preliminary data on mass values, separation energies and their impact on network calculations of the rp and νp processes will be presented.

HK 29: Astroparticle Physics

Time: Tuesday 14:00–16:00 Location: H-ZO 70

Group Report HK 29.1 Tu 14:00 H-ZO 70

GERDA, searching for the neutrinoless double beta decay in ^{76}Ge — •Peter Grabmayr — Kepler Center for Astro and Particle Physics, Eberhard Karls University, Tübingen

The observation of the neutrinoless double beta decay ($0\nu2\beta$) would verify the commonly assumed Majorana nature of the neutrino. For a Majorana neutrino this process is possible as the neutrino oscillations proof their non-vanishing mass. Consequently, one needs to extended the Standard Model as the lepton number conservation is violated. Discovery of the $0\nu2\beta$ decay could possibly resolve the hierarchy problem and set the mass scale for neutrinos.

$0\nu2\beta$ decay is a very rare process ($T_{1/2} > 10^{25}$ y) which therefore requires extremely low background experimental conditions. ^{76}Ge is well suited for the calorimetric approach where source and detector are identical. The GERDA collaboration has available ~18 kg of enriched detectors from the previous $0\nu2\beta$ experiments HdM and IGEX. In contrast to these the GERDA setup relies on a different concept of background suppression: operating the bare diodes in lAr with a large water buffer around, all located at the underground laboratory LNGS. Only screened high purity material after screening is used.

The setup will be completed and the measurements start in 2009.

This work is supported by the BMBF(05CD5VT1).

HK 29.2 Tu 14:30 H-ZO 70

Status des COBRA-Experimentes — •Tobias Köttig für die COBRA-Kollaboration — Lehrstuhl für Experimentelle Physik IV, TU Dortmund, D-44221

Das COBRA Experiment sucht nach neutrinolosen Doppel-Beta ($0\nu\beta\beta$) Zerfällen in Cd, Zn und Te Isotopen. Hierfür werden CdZnTe Halbleiterdetektoren eingesetzt. Der Nachweis des $0\nu\beta\beta$ Zerfalls würde nicht nur die Bestimmung der absoluten Neutrinomasse ermöglichen, sondern auch Aufschluss über die Natur des Neutrinos als Majorana- oder Dirac-Teilchens geben.

Da für $0\nu\beta\beta$ Zerfälle Halbwertszeiten jenseits von 10^{25} Jahren erwartet werden, ist ein extrem niedriger Untergrund nötig. Der aktuelle Stand des hierfür optimierten, am italienischen Untergrundlabor LNGS befindlichen experimentellen Aufbaus sowie die verwendeten CdZnTe Detektoren werden erläutert.

Aktuelle Grenzen auf Halbwertszeiten von verschiedenen Zerfällen werden präsentiert und ein Ausblick auf geplante Verbesserungen des experimentellen Aufbaus wird gegeben.

HK 29.3 Tu 14:45 H-ZO 70

Untergrundreduktion für das COBRA-Experiment — •Kathrin Schreiner für die COBRA-Kollaboration — Lehrstuhl für experimentelle Physik IV, TU Dortmund, D-44221

Das COBRA-Experiment sucht mit Hilfe von CdZnTe Detektoren nach extrem seltenen neutrinolosen Doppel-Beta Zerfällen ($0\nu\beta\beta$). Der von anderen Zerfällen erzeugte Untergrund, z.B. durch kosmische Strahlung, Neutronen, HF-Störungen, sowie Produkten aus natürlichen radioaktiven Zerfallsketten, muss daher möglichst gering gehalten werden.

Die industriell gefertigten Detektoren haben eine pigmenthaltige Passivierung, welche durch α-, β- und γ-Zerfälle zusätzlichen Untergrund erzeugt. Um diesen zu reduzieren, wurde die Passivierung durch zwei verschiedene pigmentfreie Passivierungen ersetzt.

Die Untergrundbeiträge dieser verschiedenen Passivierungen werden verglichen und die ersten Ergebnisse vorgestellt. Ausserdem werden Ergebnisse zur weiteren Reduktion des Untergrundniveaus im LNGS gezeigt, z.B. die Reduzierung von Radon als zusätzliche Untergrundquelle durch eine im Sommer 2008 dort angebrachte Stickstoffspülung.

HK 29.4 Tu 15:00 H-ZO 70

Modelling the Tritium Source of KATRIN — •Wolfgang Kaefer for the KATRIN-Collaboration — Forschungszentrum Karlsruhe GmbH, Institut für Kernphysik

The objective of the KArlsruhe TRItium Neutrino experiment KATRIN is the determination of the mass of the neutrino with a sensitivity of 200 meV by investigating the kinematics of the electrons from Tritium β decay. It is currently under construction at Forschungszentrum Karlsruhe.

A key component of the KATRIN experiment is the Windowless Gaseous Tritium Source (WGTS), in which Tritium decays with an activity of 10^{11} Bq. A precise understanding of the properties of the WGTS is mandatory for the neutrino mass determination. In particular the gas dynamics is crucial since the measured energy spectrum is influenced by inelastic scattering of the decay electrons with the Tritium molecules as well as Doppler broadening of the electron energy. Therefore parameters of the WGTS such as purity, temperature, density and velocity distributions of the Tritium gas and the magnetic field strength inside the WGTS have to be modelled in detail.

This talk gives an overview over the simulation and modelling program package currently in development which allows to study the influence of the WGTS parameters on the measured electron energy spectrum.

Supported by the BMBF with project number 05A08VK2 and by the DFG in SFB TR 27.

HK 29.5 Tu 15:15 H-ZO 70

A large air coil system and precision magnetic monitoring at the KATRIN main spectrometer — •Jan Reich for the KATRIN-Collaboration — Universität Karlsruhe (TH), Institut für Experimentelle Kernphysik

The aim of the KArlsruhe TRItium Neutrino experiment KATRIN is the determination of the absolute mass of the electron antineutrino with a sensitivity of 0.2 eV. The experiment will scan the endpoint region of the tritium beta decay spectrum with a spectrometer based on the MAC-E filter principle (Magnetic Adiabatic Collimation with an Electrostatic filter).

The magnetic field of the latter, especially in the analysing plane, has to fulfill certain criteria. The field gradually decreases over a length of 12 meters by a factor of 20000. Thus, in the analysing plane, the magnetic field is very low and the earth's magnetic field contributes a non-negligible part to it. By this influence the magnetic fluxtube is distorted. The axial symmetry and homogenity of the B-field is crucial to avoid background and achieve a high energy resolution.

For these reasons an external air coil system for compensating the earth's magnetic field as well as a low field correction coil system for fine tuning will be installed around the KATRIN main spectrometer in addition to a magnetic monitoring system.