HK 64: Nuclear Physics Applications

Time: Wednesday 16:30–18:15 Location: H-ZO 100

Group Report HK 64.1 We 16:30 H-ZO 100

Cubic boron nitride- a new material for ultracold neutron application — •Thorsten Lauer[1], Yury Sobolev[2], Yury Borisov[3], Manfred Daum[4], Nicolas du Fresne[2], Leonard Göltl[8], Gabriele Hampel[1], Werner Heil[2], Andreas Knecht[4,5], Martin Keunecke[6], Jens Volker Kratz[1], Thomas Lang[2], Michael Meister[2], Christian Plonka Spehr[1], Yuri Pokotylovski[7], Peter Reichert[1], Ullrich Schmidt[8], Thomas Krist[9], Norbert Wiehl[1], and Johannes Zennere[2] — [1]Institut für Kernchemie, Universität Mainz — [2]Institut für Physik, Universität Mainz — [3]PNPI Gatchina, Russland — [4]PSI, Paul Scherrer Institut, Villigen, Schweiz — [5]Universität Zürich, Schweiz — [6]Frauenhofer Institut IST, Braunschweig — [7]JINR, Dubna, Russland — [8]Physikalisches Institut, Universität Heidelberg — [9]Hahn Meitner Institut, Berlin

For the first time, the Fermi potential of cubic boron nitride (cBN) was measured at the ultra cold neutron source at the TRIGA reactor, Mainz using the time of flight method (TOF). The investigated samples have a Fermi potential of about 300 neV. Because of its good dielectric characteristics, cubic boron nitride could be used as suitable coating for insulator in storage chambers of future EDM projects. This talk will present recent results and an outlook on further investigations.

Group Report HK 64.2 We 17:00 H-ZO 100

Production and performance of ultracold neutron guides for the next generation UCN sources — •Peter Reichert[1], Michael Meister[2], Gabriele Hampel[1], Werner Heil[2], Jens Volker Kratz[1], Thorsten Lauer[1], Christian Plonka[1], Yury Sobolev[2], and Johannes Zenner[2] — [1]Institut für Kernchemie, Universität Mainz — [2]Institut für Physik, Universität Mainz

Recently, a new coating facility for the production of ultracold neutron guides started its operation at the Physics Institute University Mainz. With the use of magnetron sputtering it is possible to coat inner surfaces of glass tubes with diameters down to 50mm and a maximal length of 1.5m. By optimizing the coating parameters and due to the low surface roughness we expect higher transmission of ultracold neutrons compared to the so far existing polished stainless steel tubes. This talk will give an overview about the facility, its possibilities and first results of transmission measurements performed at the Ultracold Neutron facility at the TRIGA Mainz.

HK 64.3 We 17:30 H-ZO 100

Comparison of solid hydrogen and solid deuterium as UCN converter with the TOF method — •Yury Sobolev[1], Thorsten Lauer[2], Gabriele Hampel[2], Werner Heil[1], Jens Volker Kratz[2], Christian Plonka Spehr[2], and Johannes Zenner[1] — [1]Institut für Physik, Universität Mainz — [2]Institut für Kernchemie, Universität Mainz

At the reactor TRIGA, Mainz the working principle of a superthermal Ultracold Neutron Source based on solid deuterium was succesfully demonstrated in 2006. Besides deuterium, other converter materials like methane and oxygen has been investigated all over the world. This talk will present recent time- of- flight measurements using a superthermal UCN source based on solid hydrogen and give ideas for further developments of UCN sources at high flux reactors.

HK 64.4 We 17:45 H-ZO 100

Systematic study of EC decays in the ^{146}Gd region relevant for a Monoenergetic Neutrino Beam Facility — •Maria Esther Estevez Aguado[1], Alejandro Algora[1], Berta Rubio[1], Jose Bernabeu[1], Enrique Nacher[1], Jose Luis Tain[1], Andres Gadea[1], Daniel Cano[2], Karlheinz Burkard[3], Joachim Doering[3], Michal Gierlik[3], Wilfried Hueller[3], Reinhard Kirchner[3], Ivan Mukha[3], Cristina Plettner[3], Ernest Roeckl[3], Jose Javier Valiente[4], and Leonid Batist[5] — [1]IFIC (CSIC-UV), Valencia, Spain — [2]CIEMAT, Madrid, Spain — [3]GSI, Darmstadt, Germany — [4]INFN, Legnaro (Padova) Italy — [5]PNPI, Gatchina, Russia

The availability of a monochromatic neutrino source with adjustable energy could be an invaluable tool for the study of Charge-Parity (CP) violation in the leptonic sector in the frame of the Electroweak Theory of the Standard Model. It has been proposed [1] to use as a neutrino source nuclei that decay by means of the electron capture (EC) process inside a storage ring. A systematic study of candidate nuclei in the ^{146}Gd region has been carried out.

In this contribution we show the results of the experimental study of the beta decay of two possible candidate nuclei (^{152}Yb and ^{150}Er) using the Total Absortion Gamma Spectroscopy (TAGS) technique. A comparison of these results with earlier high resolution measurements will be discussed.

[1] J. Bernabeu *et al*, JHEP12 (Dec.2005) 014.

HK 64.5 We 18:00 H-ZO 100

Control techniques for complex detectors based on digitized pulse shape analysis — Mohammad Babai[1], Muhsin Harakeh[1], Nasser Kalantar[1], Pim Lubberdink[1], Catherine Rigollet[1], Peter Schakel[1], Haik Simon[2], •Victor Stoica[1], Matjaž Vencelj[3], and Heinrich Wörtche[1] — [1]Kernfysisch Versneller Instituut, Groningen, The Netherlands — [2]Gesellschaft für Schwerionenforschung, Darmstadt, Germany — [3]Jožef Stefan Institute, Lubljana, Slovenia

In the framework of the NUSTAR project at FAIR we have to develop controls systems which integrate automated calibration, optimization and adaptive stabilization consisting basically of the characteristics of intelligent sensors and cognitive systems. In the controls concept for the NUSTAR experiments we investigate the condition of the hardware structure, the initialization and monitoring of the system also the optimization and calibration of the detectors. Based on the digitized detector signal/pulses online feedback will be provided based on our controls techniques which support a strong correlation between signal characteristics and detector settings.

During the talk I will present a status of our present work: basline follower techniques, dynamic threshold determination and first results on self sustained calibration and optimisation loops.