HK 10: Structure and Dynamics of Nuclei II

Zeit: Montag 16:30–18:15 Raum: HZO 70

Gruppenbericht HK 10.1 Mo 16:30 HZO 70

Fast timing results from EXILL&FATIMA for fission fragments in the neutron-rich region around Z=40, N=60. — •Jan Jolie[1], Jean-Marc Régis[1], Saba Ansari[1,2], Nima Saed-Samii[1], and Nigel Warr[1] — [1]Institut für Kernphysik, Universität zu Köln, Zülpicher Str. 77, 50937 Köln — [2]CEA de Saclay, IRFU, 91191 Gif-sur-Yvette, France

Several lifetimes or lifetime limits were measured in the even-even Strontium isotopes 94-Sr, 96-Sr and 98-Sr [1] and Zirconium isotopes 98-Zr, 100-Zr, and 102-Zr [2] using the EXILL&FATIMA array [3] to perform fast electronic timing on fission products produced after cold neutron capture in 235U. Absolute values and limits for the lifetimes of the lowest yrast states could be determined. The results are compared to state-of-the-art Monte Carlo Shell Model calculations and to several predictions based on Energy Density Functionals. Supported by the BMBF, Grant No. 05P15PKFNA.

[1] J.M. Régis et al. Phys. Rev. C95 (2017) 054319 [2] S. Ansari et al. Phys. Rev. C96 (2017) 054323 [3] J.M. Régis et al. Nucl. Instr. Meth. Phys. Res. A763 (2014) 210

HK 10.2 Mo 17:00 HZO 70

Lifetime measurements in neutron-rich Ce isotopes — •Guillermo Fernández Martínez, Stoyanka Ilieva, and Thorsten Kröll for the FATIMA-GS-Collaboration — Institut für Kernphysik, Technische Universität Darmstadt, Schlossgartenstr. 9, 64289 Darmstadt

The structural evolution of neutron-rich Ce isotopes (Z=58) can be better understood through the knowledge of their low-lying states' lifetimes. The data presented here originate from an experimental campaign carried out at the Argonne National Laboratory (ANL) at the turn of the year 2015/2016, that aimed for the direct measurement of lifetimes of excited states in the ^{252}Cf spontaneous fission products. The combined usage of one hemisphere of the Gammasphere, consisting of 51 high-resolution HPGe detectors, and an array of 25 ultra-fast $LaBr_3$(Ce) scintillators from the NuSTAR-FATIMA collaboration, allowed the collection of coincident γ-rays for a period of 30 days. The selection of the Ce isotopes of interest was ensured by posing the necessary amount of energy gates in the HPGe detectors on their characteristic transitions, while the lifetimes in the region from some nanoseconds down to few tens of picoseconds were obtained from the time response of the $LaBr_3$(Ce) detectors, applying the Generalized Centroid Difference method. In the present work, first results for the lifetimes of the low-lying excited states of $^{146-150}$Ce will be shown. This work is supported by the German BMBF under grant no. 05P12RDNUP (NuPNET), the FATIMA collaboration, the TU-GSI cooperation contract and HIC for FAIR.

HK 10.3 Mo 17:15 HZO 70

Lifetimes in ^{128,130}Te extracted via the Doppler-shift attenuation method using pγ coincidences — •Sarah Prill[1], Anna Bohn[1], Michelle Färber[1], Pavel Petkov[1,2,3], Simon G. Pickstone[1], Mark Spieker[1,4], Vera Vielmetter[1], Michael Weinert[1], and Andreas Zilges[1] — [1]Institute for Nuclear Physics, University of Cologne, Cologne — [2]INRNE, Bulgarian Academy of Sciences, Sofia, Bulgaria — [3]National Institute for Physics and Nuclear Engineering, Bucharest, Romania — [4]NSCL, Michigan State University, MI 48824, USA

To study the E2 strength around the semi-magic Sn isotopes, existing data for the Te isotopes were compiled. Since the information on level lifetimes in ^{128}Te and ^{130}Te is scarce, two pγ-coincidence experiments were performed using the Doppler-shift attenuation method (DSAM) [1] at the SONIC@HORUS setup in Cologne [2]. Nuclear-level lifetimes were extracted and feeding contributions could be excluded by particle energy gates in the spectra from the new version of the silicon detector array SONIC. By determining γ-decay branching ratios and B(E2) transition strengths, systematics in the Te isotopes were examined. This contribution will present the experimental setup as well as preliminary results and discuss the systematics in the Te isotopes.

Supported by the DFG (ZI-510/7-1).

[1] A. Hennig *et al.*, Nucl. Instr. and Meth. A 794 (2015) 171-176
[2] S.G. Pickstone *et al.*, Nucl. Instr. and Meth. A 875 (2017) 104-110

HK 10.4 Mo 17:30 HZO 70

Lifetime Measurement of the 4_1^+ state in ^{212}Po — •Christian Sürder[1], Guillermo Fernández Martínez[1], Stoyanka Ilieva[1], Jan Jolie[2], Vasil Karayon[2], James Keatings[4], Thorsten Kröll[1], Georgi Rainovski[3], Jean-Marc Régis[2], Nima Saed-Samii[2], Marcus Scheck[4], Mirko von Schmid[1], and Pietro Spagnoletti[4] — [1]Institut für Kernphysik, Technische Universität Darmstadt, 64289 Darmstadt, Germany — [2]Institut für Kernphysik, Universität zu Köln, 50937 Köln, Germany — [3]Faculty of Physics, St. Kliment Ohridski University of Sofia, 1164 Sofia, Bulgaria — [4]University of the West of Scotland, Paisley, United Kingdom

^{212}Po lies just two protons and two neutrons above the doubly magic nucleus ^{208}Pb. However, its structure exhibits interesting features of shell model and cluster model configurations [Ref: A. Astier, Phys. Rev. Lett. 104, 042701 (2010)]. In April 2016 an experiment was performed at the IKP at the University of Cologne with the goal to determine the lifetime of the $4_1^+ \rightarrow 2_1^+$ transition in ^{212}Po. The HORUS setup, equiped with 8 HPGe and 8 $LaBr_3$(Ce) detectors, was used. The nucleus was populated via the ^{208}Pb(^{12}C,^{8}Be) reaction at 62 MeV. The data were analysed applying the Generalized Centroid Difference Method (GCD) [Ref: J.-M. Régis et al., Nuclear Instruments and Methods in Physics Research A 726 (2013) 191-202]. The status of the analysis will be presented.

HK 10.5 Mo 17:45 HZO 70

Lifetime determination in 192,194,196 Hg via γ-γ fast-timing spectroscopy — •Arwin Esmaylzadeh, Jean-Marc Régis, Vasil Karayonchev, Lukas Knafla, Lisa Gerhard, and Jan Jolie — Insitut für Kernphysik, Universität zu Köln

Lifetimes of excited states in ^{192,194,196}Hg were measured using the Generalized Centroid Difference (GCD) method [1]. Three fusion evaporation reactions were used at the Cologne 10 MV Tandem accelerator: ^{184}W(^{12}C,4n)^{192}Hg, ^{186}W(^{12}C,4n)^{194}Hg and ^{197}Au(p,2n)^{196}Hg to populate the states of interest. To observe the γ-rays the HORUS spectrometer was equipped with eight HPGe- and nine $LaBr_3$(Ce) detectors. Lifetimes of 2_1^+, 4_1^+ and negative parity band member states were measured in all three nuclei. The experimental results were compared and discussed in the framework of the Interacting Boson Model (IBM). Two model calculations, i.e. IBM-Configuration Mixing (IBM-CM)[2] and IBM-2 [3] were used to describe the nuclei of interest. The two models calculations describe the properties of the nuclei within the experimental uncertainties.

Supported by DFG grant JO391/16-1

[1] J-M Régis et al., Nucl. Instrum. Methods Phys. Res. 726C (2013)
[2] J. E. García-Ramos and K. Heyde, Phys. Rev. C, 89 (2014)
[3] K. Nomura, R. Rodriguez-Guzman, and L. Robledo, Phys. Rev. C 87 (2012)

HK 10.6 Mo 18:00 HZO 70

Lifetime determination in ^{211}At via γ-γ fast-timing spectroscopy — •Vasil Karayonchev[1], Piet Van Isacker[2], Andrey Blazhev[1], Christoph Fransen[1], Jan Jolie[1], and Jean-Marc Régis[1] — [1]Institute for Nuclear Physics, University of Cologne — [2]Grand Accélérateur National d'Ions Lourds, BP 55027, F-14076 Caen Cedex 5, France

Lifetimes of excited states in ^{211}At were measured using the electronic γ-γ fast timing technique [1]. The nucleus of interested was populated in a ^{208}Pb(^{6}Li,3n)^{211}At fusion-evaporation reaction at the the 10 MV Tandem accelerator at the Institute for Nuclear Physics, University of Cologne. The lifetimes of the $17/2_1^-$, $23/2_1^-$ states were determined for the first time. The experimental results are compared to two shell model calculations, one using the modified Kuo-Herling interaction [2] and the other using an empirical interaction for 3 particles in a single j=9/2 shell.

Supported by DFG grant JO391/16-1

[1] J-M Régis et al., Nucl. Instrum. Methods Phys. A Res. 726 (2013).
[2] E.K. Warburtion, and B.A. Brown, Phys. Rev. C 43 (1991) 602.