Absolute E3 and M2 transition probabilities for electromagnetic decay $K^{\pi}=8^{-}$ isomeric state in ^{132}Ce

J. Perkowski[1], J. Andrzejewski[1], A.M. Bruce[5], W. Czarnacki[3], Ch. Droste[4], E. Grodner[4], M. Kisieliński[2,3], M. Kowalczyk[2,4], J. Kownacki[2], A. Król[1], J. Mierzejewski[2,4], A. Korman[3], T. Morek[4], J. Srebrny[2], M. Zielińska[2]

[1] *Faculty of Physics and Applied Informatics, University of Łódź, Poland*
[2] *Heavy Ion Laboratory, University of Warsaw, Poland*
[3] *The Andrzej Sołtan Institute for Nuclear Studies, Świerk-Otwock, Poland*
[4] *Nuclear Physics Division, IEP, University of Warsaw, Poland*
[5] *School of Environment and Technology, University of Brighton, UK*

The problem of the K selection rule violation for electromagnetic transitions in nuclei, in spite of being a subject of extensive investigations, is not yet well understood. One of possible reasons of the phenomenon is the Coriolis interaction, which is responsible for a substantial admixture of wave function components characterized by K values higher than the main one [1-3]. However, the non-axial deformation may cause the same experimental effects. Measurement of absolute values of the transition probability can help clarifying the underlying mechanism. The nuclei from the mass area around A=130, exhibiting large triaxiality (γ around 20° ÷ 30°), constitute an excellent testing ground to study this phenomenon.

The main goal of the measurement was to determine multipolarities of the gamma transitions de-exciting the $K^{\pi} = 8^{-}$ isomeric state ($T_{1/2}$ = 9.4 ms) in ^{132}Ce. The gamma and internal conversion electron spectroscopy were carried out using the ^{16}O beam from the U-200P cyclotron of the Heavy Ion Laboratory, University of Warsaw. The OSIRIS-II, array of 11 HPGe ACS detectors was coupled to the electron spectrometer [4] for γ-γ and γ-e measurements. The main goal of this experiment was to determine multipolarities for the 526 and 798 keV transitions. The multipolarities of these transitions were determined by comparison experimentally obtained coefficients with theoretical ones. The electron spectrum gated by the 683 keV γ line, together with the decay level scheme below the isomeric state, are shown in Fig 1. Multipolarities, reduced transition probabilities, hindrance factor and reduced hindrance factor for the 526 and 798 keV transitions will be presented. Recently, the electron spectrometer was equipped in the new 12 segmented Si(Li) detector and together with the EAGLE array [5] is powerful tool for successive studies of the $K^{\pi} = 8^{-}$ isomers for N=74.

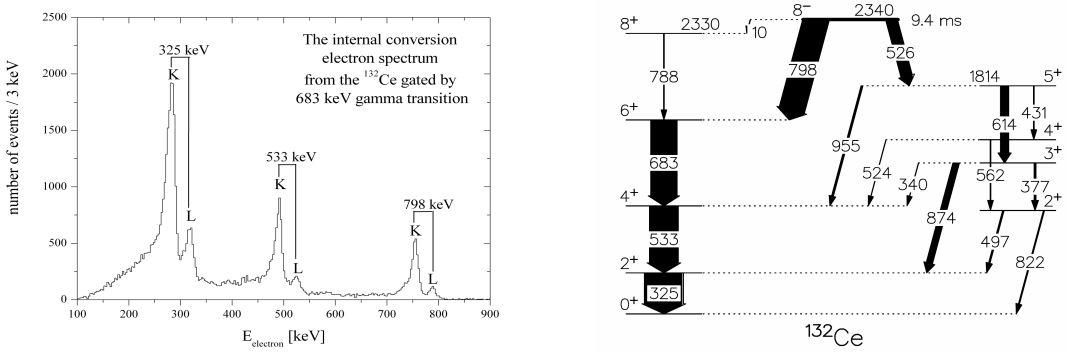

Fig. 1 The internal conversion electron spectrum showing the K and L peaks from the decay of the K-isomeric state $I^{\pi} = 8^{-}$ in ^{132}Ce populated in the ^{120}Sn(^{16}O, 4n) ^{132}Ce reaction.

[1] T. Morek *et al*., Acta Physica Polonica B 32, 2537 (2001)
[2] T. Morek *et al*., Phys. Rev. C 63, 034302 (2001)
[3] A.B. Hayes *et al*., Phys. Rev. Lett. 96, 042505 (2006)
[4] J. Andrzejewski *et al*., Nucl. Inst. and Meth A585, 155 (2008)
[5] http://www.slcj.uw.edu.pl/en/102.html