YRAST BANDS IN $^{164}Lu_{93}$ AND $^{166}Ta_{93}$ AND THE BAND CROSSING MECHANISM OF SIGNATURE INVERSION IN ODD-ODD NUCLEI*

Liu Yunzuo, Yang Hongting, Ma Yingjun, Sun Huibin, Zheng Hua,
Zhou Shangui and Huo Junde
(INPC'95, Physics Department, Jilin University, Changchun 130023, China)
Yang Chunxiang, Wen Shuxian, Liu Xiang'an
(INPC'95, China Institute of Atomic Energy, P O. Box 275, Beijing 102413, China)
H. Ryde
(INPC'95, Department of Mathematical Physics, Lund Institute of Technology, Lund, Sweden)

The band crossing mechanism was proposed to interpret the signature inversion in odd-odd nuclei of N=93 in the angular momentum projection theory [1], which predicted that the energy zigzag amplitude of signature dependence after inversion (in low spin region) increases with increasing proton number in ^{160}Ho, ^{162}Tm and ^{164}Lu while the particle-rotor model, as indicated in [1], would give a opposite prediction To test this prediction, the experimental data of the yrast band in ^{164}Lu is desirable

The high spin states in ^{164}Lu were populated in the ^{138}Ba(^{31}P, 5n) reaction with the 155 MeV ^{31}P beam from the tandem accelerator of the Niels Bohr Institute. The yrast band of ^{164}Lu is observed up to I=27 ħ. In order to show the signature inversion more clearly, the quantity E(I)-E(I-1)-[E(I+1)-E(I)+E(I-1)-E(I-2)]/2, instead of E(I)-E(I-1), is plotted against spin for ^{164}Lu together with that of ^{160}Ho [2] and ^{162}Tm [3] in Fig.1, which shows that the zigzag amplitude after signature inversion (in low spin region) increases with increasing Z, as predicted in [1], and the spin value at the inversion point also increases with increasing Z. The later result could also be understood qualitatively on the basis of the band crossing mechanism as discussed in the present work.

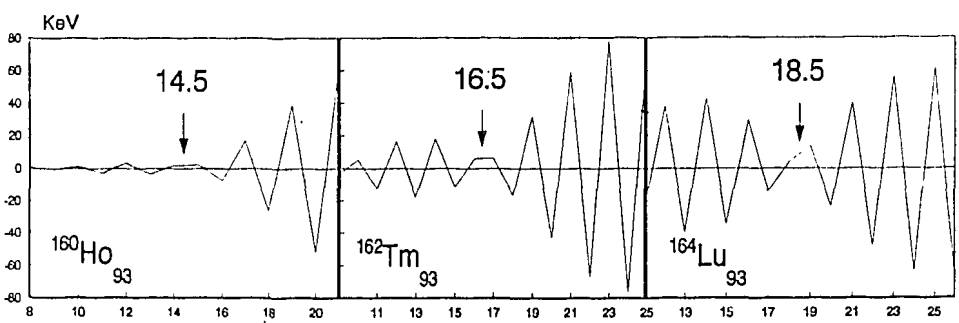

Fig. 1. E(I)-E(I-1)-[E(I+1)-E(I)+E(I-1)-E(I-2)]/2 vs. I

High spin states of ^{166}Ta were populated through the ^{141}Pr(^{28}Si, 3n) reaction with the 127 MeV ^{28}Si beam provided by the HI-13 tandem accelerator at the China Institute of Atomic Energy in Beijing. Preliminary results show that the zigzag amplitude after inversion (in low spin region) and the spin value at inversion point of the yrast band in ^{166}Ta keep the similar increasing trends as that of ^{164}Lu. This is in consistent with the band crossing mechanism of signature inversion proposed in [1].

References

1) K. Hara and Y. Sun, Nucl. Phys. **A531**(1991)221
2) J.L. Salicio, M Délèze, S.Drissi, J. Kern, S.J. Mannanal, J.P. Vorlet and I. Hamamoto,Nucl .Phys. A512(1990)109
3) S. André, D. Barnéoud, C. Foin, J. Genevey, J.A. Pinston, B. Haas, J.P. Vivien, and A.J. Kreiner, Z Phys A333(1989)247

* Work supported by National Natural Science Foundation of China