The predicted 19/2$^-$isomer in ^{129}Pd could decay by both electromagnetic transitions and neutron emission with comparable partial life-times, making it a good candidate for neutron radioactivity, a decay mode which is yet to be discovered. More details of this study can be found in the publication[6].

Study of the octupole deformation properties in ^{224}U using the RDT method

The strongest octupole correlations are predicted by the HFB calculation to be in the uranium isotopes with N ~134. Improved total Routhian surface calculations show that the ground states of ^{222,224,226}U have static octupole deformations and the most favorable case for stable octupole deformation appears to be ^{224}U which is consistent with previous predictions. An experiment studying the octupole properties of ^{224}U at Argonne National Laboratory was carried out via the ^{20}Ne(^{208}Pb,4n) reaction at 109 MeV using the digital GAMMASHERE + FMA + MCP +DSSD setup. The progress of the data analysis is reported in the annual report[7].

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2 - 19 First Identification of the $\nu h_{11/2}$ band in ^{117}Ba*

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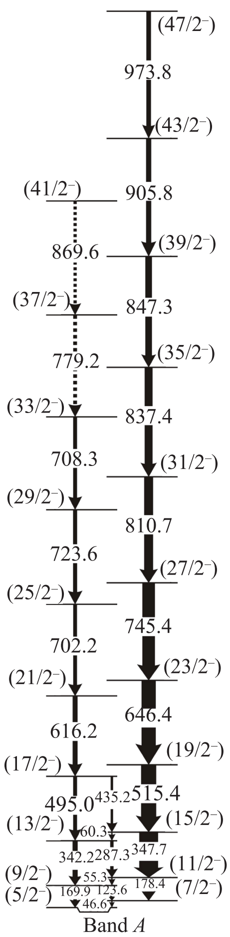

Fig. 1 The $\nu h_{11/2}$ band in ^{117}Ba deduced in this work.

Taking advantage of the large γ-detector array Gammasphere and the recoil mass separator FMA, high-spin states in ^{117}Ba were investigated through the recoil-β-delayed proton decay tagging technique via the heavy-ion induced fusion-evaporation reaction ^{64}Zn (^{58}Ni, 2p3n) ^{117}Ba, at a beam energy of 305 MeV. Prompt γ rays belonging to ^{117}Ba have been identified furthermore, a rotational band has been identified for the first time and presented as band A in Fig. 1.

In ^{117}Ba (N = 61), the neutron Fermi surface lies between the $\nu g_{7/2}/d_{5/2}$ orbitals and the lower part of the $\nu h_{11/2}$ subshell. Collective bands based on these orbitals have been observed at low excitation energy in most nuclei in this region. Due to the high-j nature of the $\nu h_{11/2}$ orbital, bands built on them are strongly populated and become yrast in these nuclei. The relative excitation energies of the $\nu h_{11/2}$ bands in odd-A $^{119-129}$Ba are plotted together with band A in Fig. 2 from which we can see that band A follows the systematic trend of the $\nu h_{11/2}$ bands so well that it most likely has the same origin. We note that that the lowest states in the $\nu \mathrm{h}_{11/2}$ bands of ^{117,119,121}Ba are all characterized by a I^{π} = 5/2$^-$gvalue, suggesting that they are all associated with the same $\nu h_{11/2}$[532]5/2$^-$ configuration as proposed in Refs. [1,2] for ^{119,121}Ba.

To investigate further the rotational properties of band A in ^{117}Ba, the experimental aligned angular momenta i_x and Routhians e' were extracted. The unfavored α = +1/2 sequence experiences a band crossing at $\hbar\omega$ = 0.35 MeV while the favored α = −1/2 one

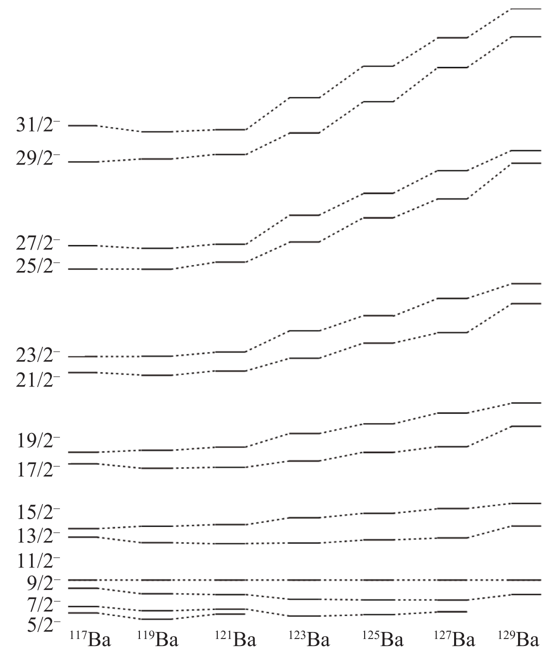

Fig. 2 Excitation-energy systematics for $\nu h_{11/2}$ bands in odd-A $^{117-129}$Ba. The data for $^{119-129}$Ba are taken from Refs. [1] and [3-7].

exhibits an upbend at a slightly higher crossing frequency $\hbar\omega = 0.41$ MeV. The total aligned angular momentum gain is ~65 $\hbar$ for both signatures. Since band A is proposed to be based on the $\nu h_{11/2}[532]5/2^-$ configuration, the first $h_{11/2}$ neutron (EF) alignment is blocked. The following EH (FG) alignment is estimated to occur at a crossing frequency above 0.6 MeV; *e.g.*, much higher than the experimental value. Thus, a neutron alignment is ruled out for this band. A proton ef alignment is expected to be responsible for the band crossing. The observed large aligned angular momentum (~ 65 $\hbar$ for both signatures) agrees well with the alignment of a pair of $\Omega = 1/2$, $h_{11/2}$ quasiprotons.

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* Foundation item: "100 Person Project" of Chinese Academy of Sciences and National Natural Science Foundation of China (11405224 11675225, U1632144, 11635003)