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Study of Dependence of Quasi-Particle Alignment on Proton and Neutron Numbers in A= 80 Region through g-factor Measurements*

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The interplay between the collective rotation and the quasi-particle alignment is a significant feature of nuclear structure at high spins. The g-factors of intra-band high spin states of the ground rotational band can provide direct and unique information on quasi-particle alignment since the g-factors of the high-j proton and the high-j neutron are positively large and negatively small, respectively.

The g-factors of high spin states of the ground rotational band in ^{82}Sr , ^{83}Y , ^{84}Zr , ^{85}Nb , ^{85}Zr and ^{86}Zr have been measured in order to study the dependence of quasi-particle alignment on the proton and neutron numbers.

The high spin states of the ground rotational band in ^{82}Sr , ^{83}Y , ^{84}Zr , ^{85}Nb , ^{85}Zr and ^{86}Zr were populated by the fusion-evaporation reactions with the heavy ion beams from the HI-13 tandem accelerator at China Institute of Atomic Energy. The transient -magnetic-field ion implantation perturbed angular distribution (TMF-IMPAD) method was used to determine the g-factors of high spin states along the ground rotational band. The model calculations were also carried out for some nuclides, which well reproduced the experimentally measured g factors.

The experimental results are shown in the above figure. It can be seen that for the nuclides ^{84}Zr , ^{85}Zr and ^{86}Zr with $Z=40$ the proton alignment is followed by the neutron alignment in ^{84}Zr and ^{85}Zr , while the neutron alignment is followed by the proton alignment in ^{86}Zr , and for the nuclides ^{82}Sr , ^{83}Y , ^{84}Zr and ^{85}Nb with $N=44$ the proton aligns only in ^{82}Sr , the proton aligns first that is followed by the neutron alignment in ^{83}Y and ^{84}Zr and the neutron alignment is followed by the proton alignment in ^{85}Nb . A discussion regard the observed dependence will be presented.

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