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THE EFFECTIVE MOMENT OF INERTIA OF ^{118}Xe AND ^{130}Ba

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International Symposium on In-beam nuclear spectroscopy, Debrecen, Hungary, May 14-18, 1984

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Experiments were performed with the Grenoble cyclotron accelerating 112 and 80 MeV ^{12}C ions on ^{112}Sn and ^{122}Sn enriched targets, respectively. The total γ energy was recorded in a sum-spectrometer made of 12 hexagonal cross-section (20 cm long, 15 cm outer diameter) NaI(Tl) detectors arranged in a cylinder along the beam axis. The γ-ray spectra were obtained by means of another hexagonal crystal which was placed at 55° to the beam, strongly collimated and in coincidence with the sum-spectrometer. The raw γ-spectra were unfolded and normalized to the multiplicity extracted from the fold distribution in the 12 pieces sum-spectrometer. The subtraction of the statistical component $E_\gamma^3 \exp(-E_\gamma/T)$ was made using a nuclear temperature of 0.50 MeV for both cases presented here. A correction for feeding was applied following the method employed by Deleplanque et al. [1]. The final nuclei produced in the reactions were identified by a Ge detector in coincidence with the sum-crystal.

Results relative to the moment of inertia of ^{118}Xe are shown in fig. 1. $\mathcal{J}^{(2)}_{eff}$ increases rapidly with the frequency up to the first band crossing ($h_{11/2}$ neutrons and/or protons) at $\hbar\omega$ = 0.39 MeV and has approximately the same amplitude as $\mathcal{J}^{(2)}_{band}$. Two bumps show up at 0.53 and 0.62 MeV. They appear at the same frequencies as bridges in the γ-γ energy correlation matrix [2] and are very likely due to particle alignments. Then $\mathcal{J}^{(2)}_{eff}$ continues to increase while $\mathcal{J}^{(2)}_{band}$ remains constant. This is not in favor of a good collective behavior and suggests a triaxial shape with large γ values (γ ∿ 30°).

In the case of ^{130}Ba, the data indicate that $\mathcal{J}^{(2)}_{eff}$ behaves similarly with a peak at $\hbar\omega$ = 0.55 MeV which corresponds to a strong bridge in the correlation matrix [2]. Taking into account the variations of $\mathcal{J}^{(2)}_{band}$ and $\mathcal{J}^{(2)}_{eff}$, it appears that the collectivity is larger in ^{130}Ba than in ^{118}Xe.

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[1] M.A. Deleplanque et al., Phys.Rev. Lett.50(1983)409

[2] H.EL-Samman et al. Communication to this conference.