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MEASUREMENT OF $\mathcal{J}^{(2)}_{band}$ IN ^{123}Cs

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As shown in a preceding paper [1] the collective moments of inertia $\mathcal{J}^{(2)}_{band}$ of Xe and Ba nuclei behave differently. This can be interpreted considering the collectivity (Ba) or non-collectivity (Xe) of these nuclei and/or the existence of a strongly deformed secondary minimum in the potential-energy surfaces of the bariums. Experimental data were collected on ^{123}Cs in order to bring some insight on the behaviour of nuclei in this transitional region.

An experiment was performed with the Grenoble cyclotron by bombarding a ^{115}In target with 80 MeV ^{12}C ions. The γ-γ energy correlations were measured using six 8"x6" hexagonal NaI(Tl) detectors. At this beam energy, the correlation matrix is mainly generated by ^{123}Cs since the 4n channel represents more than 60.% of the total cross-section.

It appears in fig. 1 that, up to $\hbar^2\omega^2 = 0.16$ MeV^2, the moment of inertia of ^{123}Cs increases and follows the $\mathcal{J}_0+3\omega^2\mathcal{J}_1$ relation where $\mathcal{J}_0$ and $\mathcal{J}_1$ are deduced from the discrete lines. ^{123}Cs and ^{122}Xe behave similarly up to 0.30 MeV^2 and then the moment of inertia increases rapidly in ^{123}Cs while it stays almost constant in the xenon. This effect observed in the cesium is directly related to the addition of a proton to the ^{122}Xe core.

Indeed, calculations as in ref.[1] show that the $(\pi h^2_{11/2}\ \nu h^6_{11/2})$ band with a prolate deformation ($\mathcal{J}^{(2)}_{band} = 35 - 40\ \hbar^2$ MeV^{-1}) is lower than the band with the same configuration at $\gamma \approx 30°$ above spin 20 for ^{123}Cs, whereas for ^{122}Xe, they are calculated to have almost the same energy. The experimental results of ref.[1] indicate that ^{122}Xe tends to favour the triaxial bands. It is thus tempting to interpret the rise of $\mathcal{J}^{(2)}_{band}$ in ^{123}Cs as a change of deformation from $\gamma \approx 30°$ to $\gamma \approx 0°$.

[1] H. El-Samman et al., Communication to this conference

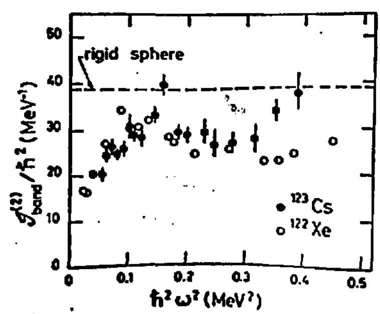

Fig.1 : Comparison of the collective moments of inertia of ^{122}Xe and ^{123}Cs.