

BAND CROSSINGS IN THE SUPERDEFORMED BANDS IN ^{145}Gd

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Superdeformation in ^{145}Gd has been studied using the GASP spectrometer at the Tandem XTU accelerator of the Legnaro National Laboratory. A self-supporting foil of ^{114}Cd (1.07 mg/cm^2) was bombarded with a 182 MeV ^{36}S beam. The nucleus ^{145}Gd was produced the strongest with $\approx 35\%$ of the total cross section for compound nucleus formation through the 5n channel. Two new superdeformed (SD) bands have been established, consisting of 18 and 17 transitions, respectively (see fig.1). Both bands can clearly be assigned to ^{145}Gd since the strong transitions between normal deformed states in ^{145}Gd appear in coincidence with the SD bands.

The dynamic moments of inertia of the SD bands in ^{145}Gd are plotted as function of the rotational frequency in fig.2. The dynamic moment of inertia of the yrast SD bands decreases smoothly and has values similarly to those observed in the neighbouring Gd nuclei outside the respective band crossing regions. The first

excited SD band shows two subsequent band crossings at rotational frequencies of ≈ 0.4 and 0.68 MeV, respectively. The pronounced low-frequency crossing is similar to that observed at a rotational frequency of 0.45 MeV in ^{144}Gd and has been associated with the alignment of an $i_{13/2}$ proton pair [1]. The second band crossing has similar features as that found in ^{146}Gd at 0.65 MeV and is interpreted as the intersection of the $\nu[642]5/2$ and $\nu[651]1/2$ orbitals [2]. Theoretical calculations confirm these assignments. This is the first time that two bands crossing have been observed in one SD band.

References

- [1] S. Lunardi et al., Phys. Rev. Lett 72 (1994) 1427
 [2] G. Hebbinghaus et al., Phys. Lett. B240 (1990) 311

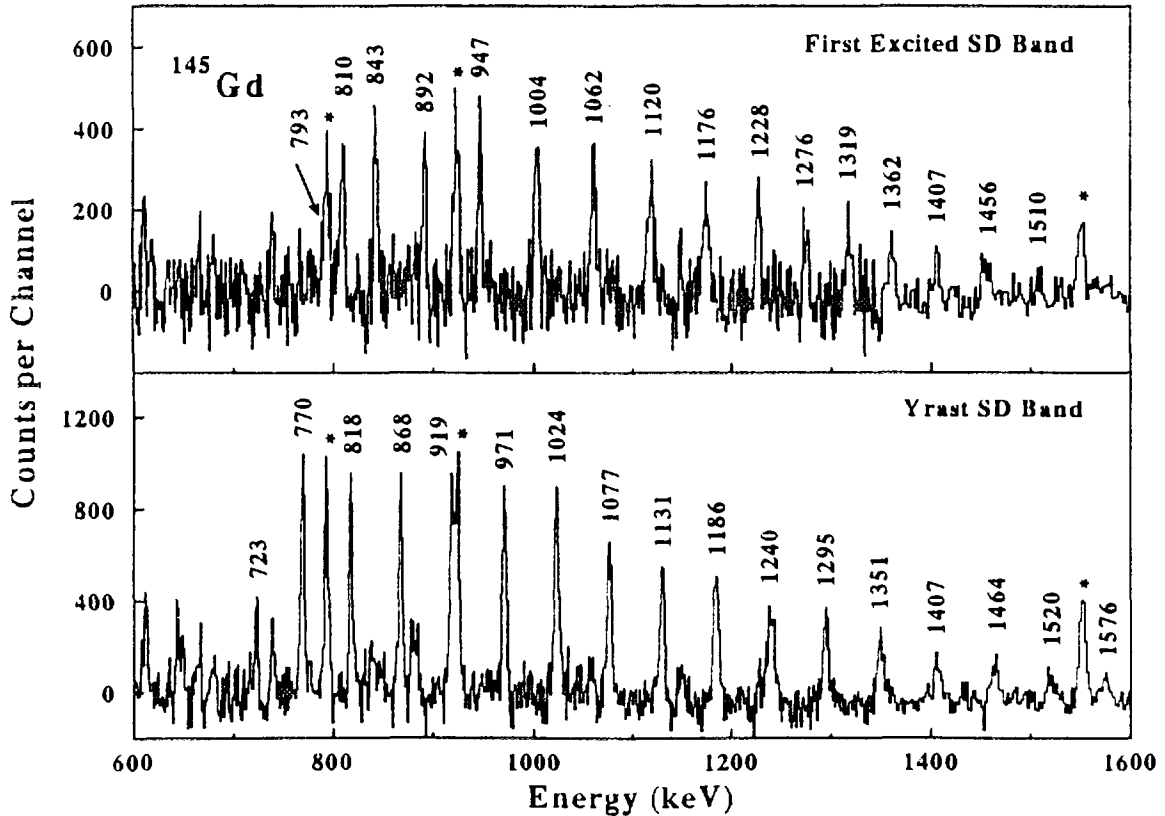


Figure 1. The yrast and first excited SD bands in ^{145}Gd .

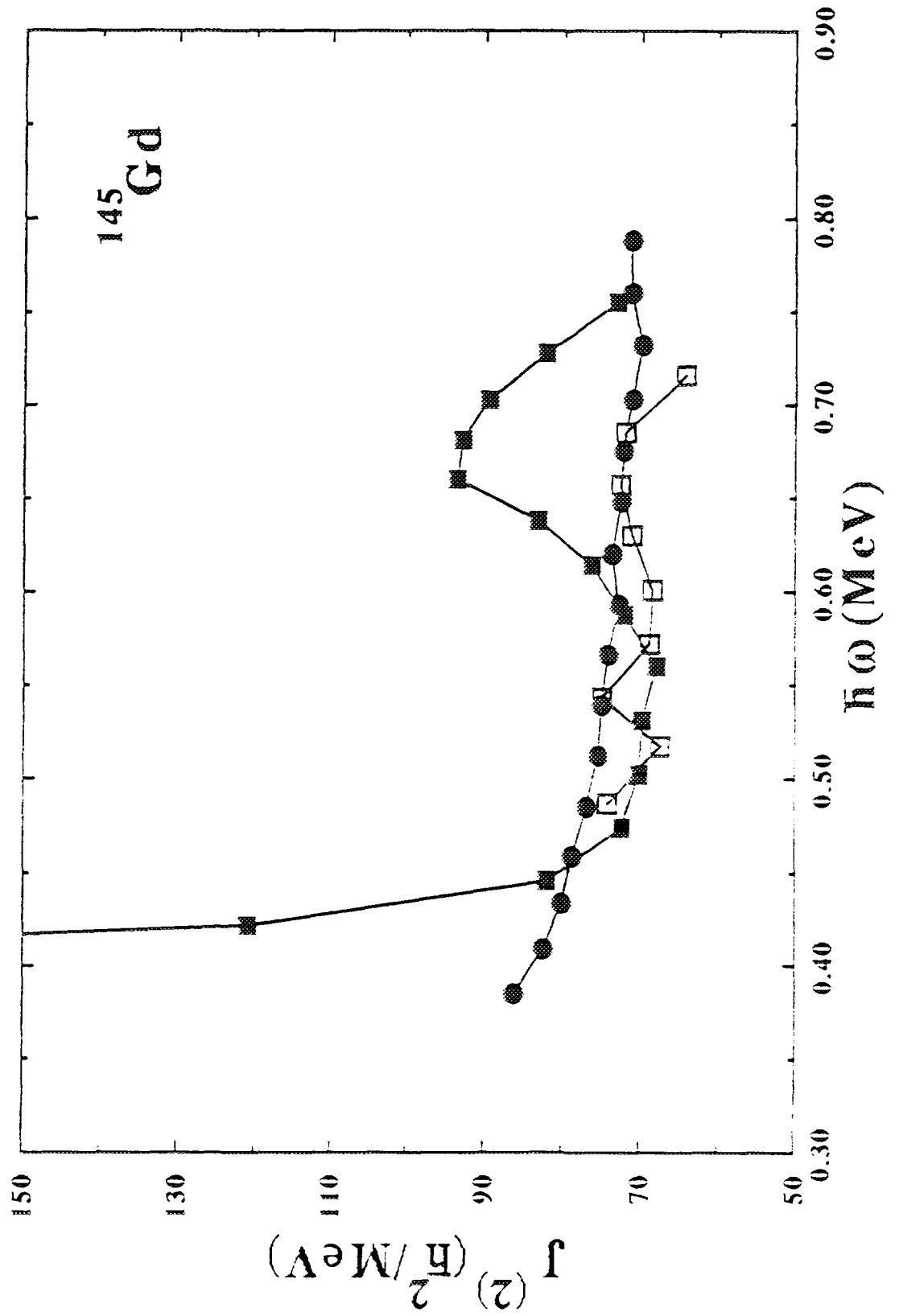


Figure 2. Plots of the dynamic moments of inertia as function of the rotational frequency for the SD bands in ^{145}Gd .