Search for Octupole Fragmentation in ^{134}Ba ◇

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1. Introduction

The observation of the large fragmentation of the low energy octupole state in the O(6) (γ-soft) nuclei ^{194}Pt, ^{196}Pt, and ^{198}Pt [1,2] has raised the question of whether similar fragmentation occurs in the Xe and Ba isotopes near N=78, which may possess the O(6) symmetry as well [3].

2. Experimental results

The behavior of the low energy octupole state in ^{134}Ba was examined using proton inelastic scattering at 22 MeV at the Munich Tandem van de Graaff Accelerator Laboratory. The scattered protons were analyzed with the Q3D - magnetic spectrograph and detected with the high resolution focal plane detector. The target was 0.1 mg/cm^2 and the data were taken in steps of 5° from 25 to 60 deg lab angles. The 4-5 keV FWHM energy resolution allows the study of about 20 states up to 3.5 MeV excitation energy. A few states are candidates to be octupole states. The complete data analysis and the spin assignment is still in progress but one conclusion already emerged: there is no strong peak above the lowest 3^- state at 2255 keV.

The proton spectrum in the energy range between 1.8 and 4 MeV, which is shown in Fig. 1, includes a strong peak corresponding to the lowest 3^- state at 2255 keV. No other peaks at higher excitation energy of comparable strength are observed. From this spectrum, we conclude that strong fragmentation of the low energy octupole state expected for a γ soft nucleus does not occur in ^{134}Ba.

3. Conclusion

The strong octupole fragmentation predicted for O(6) type of nuclei was not seen in ^{134}Ba. Similar studies of lighter Ba isotopes are planned. These include (d,d') experiments, which should display angular distributions more characteristic of the transfer l-value, and studies of ^{130}Ba as well.

References

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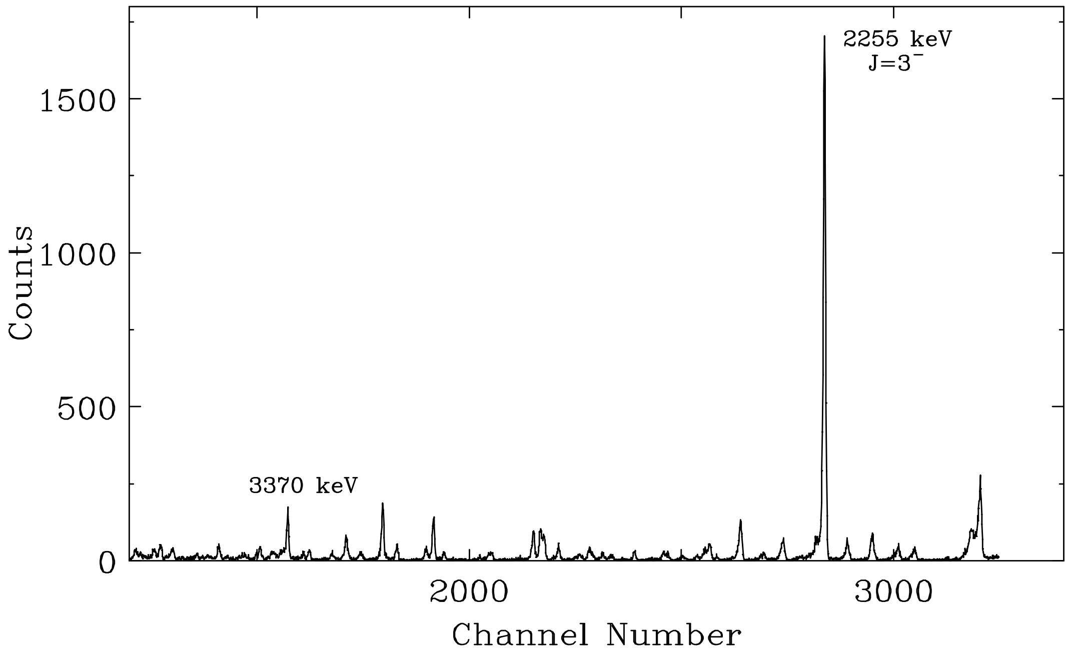

Fig. 1: Proton spectrum for an excitation energy range of 1.8 to 4 MeV taken at 30 °

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