Spectroscopic information about a hypothetical tetrahedral configuration in ^{156}Gd

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Abstract

A detailed γ-ray spectroscopy of the lowest two negative-parity bands in ^{156}Gd has been performed ...

Keywords: γ-ray spectroscopy, ^{156}Gd

1. Introduction

Theoretical studies based on the nuclear mean-field approach and group theory considerations suggest [1, 2] that some atomic nuclei may exhibit tetrahedral and/or octahedral symmetries. To the lowest order, tetrahedral symmetry is realized through octupole deformation $Y3 \pm 2$ of the nuclear surface. Previous research[3] has determined magic numbers for which tetrahedral deformation should be the easiest to observe leading to tetrahedral proton and neutron "magic" numbers Zt/Nt = 32, 40, 56, 64, 70, 90, and 112, with extra gaps at Nt = 136 and 142. The authors of Refs. [1, 2, 3] have furthermore demonstrated that nuclei with an exact tetrahedral symmetry have all multipole moments $Q_\lambda < 7$, $\nu = 0$ except for Q_{32} - thus, in particular, the corresponding quadrupole moments Q_2 vanish.

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The radiation intensity can be written down using the standard expression in the Equation 1.

$$I(\theta) = 1 + A_2 P_2(\cos\theta) + A_4 P_4(\cos\theta) \qquad (1)$$

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2. Experiment setup

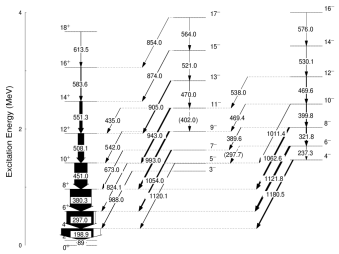

Figure 1: Partial level scheme of 156Gd.

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3. Spectroscopy information

Transition intensities are presented in the Figure 1 ...

4. Acknowledgements

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Appendix A. Experiment data

Experiment data are shown in the Table A.1 ...

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Table A.1: Data γ ray detection.

Interaction	Clover	Cluster
1	74.5	79.8
2	22.4	18.3
$\geq$3	¡3.3	¡2.8

References

[1] J. Dudek, et al., Phys. Rev. Lett. 97 (072501).
[2] N. Schunck, et al., Acta Phys. Pol. B 36 (1071).
[3] J. Dudek, et al., Phys. Rev. Lett. 88 (252502).