

# Spectroscopic information about a hypothetical tetrahedral configuration in $^{156}\text{Gd}$

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## Abstract

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

**Keywords:**  $\gamma$ -ray spectroscopy,  $^{156}\text{Gd}$

## 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  $Z_t/N_t = 32, 40, 56, 64, 70, 90$ , and 112, with extra gaps at  $N_t = 136$  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.

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

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## 2. Experiment setup

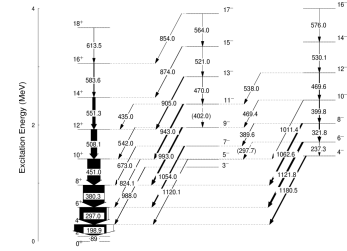


Figure 1: Partial level scheme of  $^{156}\text{Gd}$ .

## 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 $\gamma$ 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).