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

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**Abstract**

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

*Keywords:* $\gamma$-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. ............... The radiation intensity can be written down using the standard expression in the Equation 1.

$$I(\theta) = 1 + A_2P_2(\cos\theta) + A_4P_4(\cos\theta) \tag{1}$$

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## 2. Experiment setup

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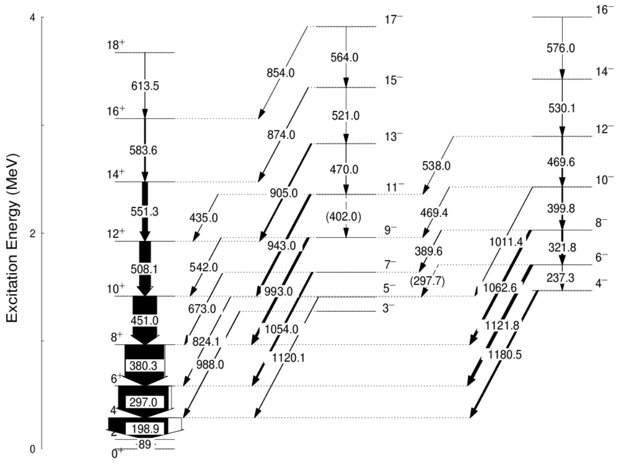


Figure 1: Partial level scheme of 156Gd.

## 3. Spectroscopy information

Transition intensities are presented in the Figure 1 ...

## 4. Acknowledgements

Thiswork benefited from the TNT2-D cards, developed and financed by CNRS/IN2P3 for the GABRIELA project ...

## Appendix A. Experiment data

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

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).