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Two-photon excitation of the $4f^1 \rightarrow 5d^1$ transitions of Ce^{3+} in $LuPO_4$: a comparison between theoretical and experimental intensities

J. SZTUCKI*,⁽¹⁾ and J. SYTSMA**

* *Institut de Physique Nucléaire de Lyon, IN2P3-CNRS et Université Claude Bernard, 43 Bd du 11 Novembre 1918, 69622 Villeurbanne cedex, France*

** *Chemical Sciences Division, Lawrence Berkeley Laboratory, Berkeley CA 94720, U.S.A.*

Abstract

The theory of two-photon f-d transitions developed by Sztucki and Stręk has been adopted to the particular case of the Ce^{3+} ion in $LuPO_4$. The intensities of two-photon transitions from the ground state $4f^1(\Gamma_6)$ to the five crystal-field components of the $5d^1$ state has been calculated and compared with the experimental data. It has been shown that the crystal-field mechanism is not able to reproduce the experimental results properly. Taking into account the contribution produced by light induced polarization of ligands (so called dynamic mechanism) led to the fairly good agreement between theory and experiment.

It has been demonstrated how the analysis of the relative intensities of TP transitions can serve as an experimental test of the theoretical ratio between the static and dynamic contributions.

⁽¹⁾ Permanent address: Instytut Niskich Temperatur i Badań Strukturalnych, P.A.N., skr. poczt. 937, 50-950 Wrocław, Poland