LETTERS TO THE EDITOR

ACCURATE DETERMINATION OF M1–E2 MIXING RATIO AND NUCLEAR STRUCTURE PARAMETER OF THE 39·58 keV TRANSITION IN 129 Xe

THE L– sub shell ratios of the 39·58 keV transition in 129 Xe were measured quite accurately by Geiger *et al.*[1], using an iron free double focussing beta ray spectrometer. The experimental values were used by Geiger *et al.*[1] to derive the values of the M1–E2 mixing ratio as M1 + (0·075 ± 0·025) % E2. Considering the low energy of the transition and the spins of the levels, namely, 3/2 and ½ which the transition connects the M1 component should be 1-forbidden. Consequently gamma transition matrix element should be smaller than in the normal case. As a result the anomaly parameter defined as the ratio of the penetration matrix element and the gamma ray matrix element should be sizeable. Such an anomaly factor was searched for, by Venkata Ramaniah *et al.*[2], by analysing the L subshell ratios of Geiger *et al.*[1], in conjunction with the theoretical tabulations of Hager and Seltzer[3,4] for conversion coefficients and penetration functions, in a bid to get an accurate value of the M1–E2 mixing ratio of this transition. A plot of λ *vs* δ^2 was made for experimental values of L_I/L_{II}, L_I/L_{III} and L_{II}/L_{III} in terms of the experimental conversion coefficient ratios and penetration functions. The centre of gravity of the area common to the three ratios would yield values of λ and δ^2. Since in Fig. 1, Venkata Ramaniah[2] derived the values of λ and δ^2 from a shaded area which is not common to the three subshell ratio lines, it was thought desirable to reanalyse the data from the point of view of mixing ratio and penetration parameter. In Fig. 1, we have given the diagram obtained from a careful analysis of experimental and theoretical data which is listed in Table I.

TABLE I

Experimental and theoretical subshell ratios used in the analysis

Sub shell Ratio	Theoretical		Experimental
	E2	M1	
L_I/L_{II}	0·0625	12·45	$10 \cdot^{+0\cdot625}_{-0\cdot577}$
L_{II}/L_{III}	0·7238	4·08	$3\cdot225^{+0\cdot49}_{-0\cdot40}$
L_I/L_{III}	0·0452	50·8	$32\cdot258^{+4\cdot2}_{-3\cdot4}$

The values of δ^2 and λ are as under :

$$\delta^2 = (0\cdot04 \pm 0\cdot03)\ \%$$

$$\lambda = 12 \pm 6.$$

The sign of λ is compatible with the effective operator calculations of Subba Rao[5] which predict the sign of λ to be positive for all odd particle transitions.

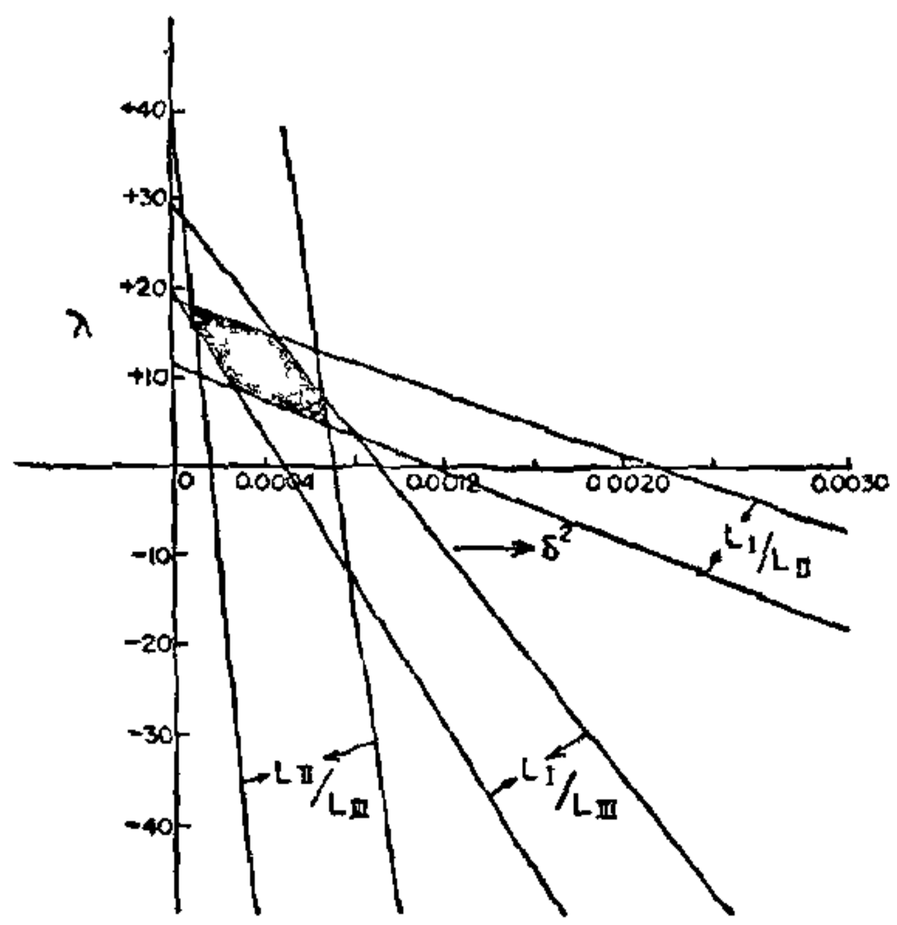

FIG. 1. Plot of λ *vs.* δ^2 for the 39·58 keV transition in 129 Xe.

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