

# 11.5

## EO AND EO+M1+E2 TRANSITIONS IN $^{178}\text{Hf}$

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Even-even deformed nuclei present a rotational band built on their ground state  $0^+$ . In some of these nuclei higher energy levels are interpreted as members of a rotational band built on the  $\beta$ -vibrational level.

From the special models of  $\beta$ -vibrational levels one may foresee allowed E0 transition probabilities. The E0 mode is not necessarily weak. For large Z the E0 emission rate may be comparable to the M1 emission rate, and considerably superior to the E2 one.

At Institut des Sciences Nucléaires in Grenoble we have determined some characteristics in the E0 and EO+M1+E2 transitions in  $^{178}\text{Hf}$ .

In the two EO+M1+E2 transitions of 1183 and 1403 keV the E2 component in the M1+E2 mixture has been determined by Hamilton et al. to be 14.4 % and 39.0 % respectively. We used these values together with our own experimental results to calculate the percentage of E0 electrons in the total number of emitted electrons and to estimate the ratio between the E0 and E2 electron intensities, the  $q^2$  term.

We found the two transitions to have strong  $q^2$  values, i.e. a sizeable admixture of E0 electrons. This is in accordance with the theory concerning transitions going from  $\beta$ -vibrational bands, but it is not enough to definitely give a  $\beta$ -vibrational character to the 1276 and 1496 keV levels in  $^{178}\text{Hf}$ .