

$4_1^+ \rightarrow 2_2^+$ TRANSITION IN ^{60}Ni

A. Ljubičić

Institute "Ruđer Bošković", Zagreb, Yugoslavia

B.A. Logan

Physics Department, University of Ottawa, Ottawa, Canada

W.R. Dixon and R.S. Storey

Division of Physics, NRC of Canada, Ottawa, Canada

Low-lying levels in ^{60}Ni at 2506-, 2285-, and 2159-keV constitute a $(4^+, 0^+, 2^+)$ triplet characteristic of the harmonic vibrational model. In the present experiment we have made a careful measurement of the zero-phonon, $4_1^+ \rightarrow 2_1^+$, 2506-2159-keV transition. This transition was first observed by Van Hise and Camp¹⁾ using a Compton-suppressed Ge(Li) detector. Since their value was larger than previous estimates of its upper limit by about one standard deviation²⁾, we have undertaken a new measurement.

The 0.65 μCi ^{60}Co source was mounted between a NaI(Tl) (10.2 cm length x 12.7 cm dia) and Ge(Li) (70 cm^3) detector. A fast coincidence between detectors was defined by a conventional TAC and SCA arrangement. An additional slow coincidence was required with an energy gate of about 1920-2520-keV placed on the NaI(Tl) pulses. The final logic signal was used to open linear gate for the Ge(Li) pulses which were then recorded in a 2048-channel analyzer.

After about three weeks of data collection a clear peak at the 347-keV was obtained. This γ -ray is identified as the 2506-2159-keV zero-phonon transition in ^{60}Ni . The intensity was estimated to be $(6.9 \pm 1.0) \times 10^{-5}$ per beta desintegration of ^{60}Co . The mean lifetime of the 2506-keV level is³⁾ $\tau = 750_{-300}^{+2700}$ fs, implying that the width for the zero-phonon transition is of the order of one Weisskopf unit.

References

1. J.R. Van Hise and D.C. Camp, Phys. Rev. Lett. 23 (1969) 1248
2. W.R. Dixon and R.S. Storey, Can. J. Phys. 48 (1970) 483
3. H. Ronsin, P. Beuzit, J. Delaunay, R. Ballini, I. Fodor, and J.P. Fouan, Nucl. Phys. A207 (1973) 577