Erratum: 2\(^+\) \rightarrow 0\(^+\) transition strengths in Sn nuclei


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In our previous work [1], we presented a new lifetime measurement for the 2\(^+\) state in \(^{112}\)Sn, as determined through the Doppler-shift attenuation method following the \((n, n'\gamma)\) reaction [2]. Here, the theoretical \(F(\tau)\) value with which one compares the measured \(F(\tau)_{\text{exp}}\) should be modified by an additional term to correct for the recoil velocity distribution when scattering at a neutron energy, \(E_n\), well above the energy threshold, \(E_{\text{level}}\) [2]. For an angular distribution approximately isotropic in the center of mass, the total \(F(\tau)\) is given by

\[
F(\tau)_{\text{total}} = F(\tau) + F'(\tau, v_0) v_0 \times \left[ \frac{3}{5} - \frac{8z(A + 1)}{15A} - \frac{z^2(A + 1)^2}{15A^2} \right],
\]

where \(z = E_{\text{level}}/E_n\); \(F'(\tau, v_0) \times v_0\) is about 0.1 for lifetimes around 500 fs in the \(A \sim 50\) region. Hence, this correction may be important and should be added to the standard \(F(\tau)\) value.

Subsequent to our previous publication, we have reexamined the corrections for the 2\(^+\) state at 1256.7 keV in \(^{112}\)Sn, which adds only 30 fs to the lifetime. This correction was overestimated in our previous publication [1]. As a result, we reported an erroneously long lifetime. A detailed study of the Doppler-shift attenuation method for the long tail of the theoretical \(F(\tau)\) curve, i.e., for small \(F(\tau)\) values and lifetimes longer than 500 fs, yields a shorter lifetime from the experimental \(F(\tau)\) value previously presented. The lifetime of the 2\(^+\) state has been redetermined as 535\(^{+100}\)\(^{-80}\) fs, which gives a larger \(B(E2; 2^+_1 \rightarrow 0^+_1)\) value of 15.2\(^{+2.6}\)\(^{-2.4}\) W.u., in agreement with the accepted value in the nuclear database [3]. As shown in Fig. 1, the enhancement of \(E2\) strengths as the \(N = 50\) shell closure approaches still prevails in the even-mass Sn isotopes, as identified in a recent study of \(^{108}\)Sn by Banu and collaborators [4], as well as the disagreement they report with the symmetric trend in the systematics of \(E2\) strengths predicted by shell model calculations [4].

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