Erratum


Published in:
Physical Review C

DOI:
10.1103/PhysRevC.104.029901

Published: 26/08/2021

Document Version
Peer reviewed version

Link to publication on the UWS Academic Portal

Citation for published version (APA):
https://doi.org/10.1103/PhysRevC.104.029901

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Erratum: Probing isospin symmetry in the \(^{50}\text{Fe},^{50}\text{Mn},^{50}\text{Cr}\) isobaric triplet via electromagnetic transition rates

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(Dated: August 17, 2021)

PACS numbers:

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The published $B(E2 \downarrow; 2^+ \rightarrow 0^+)$ value of 237(8) $e^2$fm$^4$ for $^{50}$Mn [1] was obtained by using the measured lifetime value of the first $2^+$ state in $^{50}$Mn and the relative intensities of 64.1(12) and 100(2) for the 149 keV and 800 keV $\gamma$-decays, respectively taken from a table in Ref. [2]. With this note, we clarify that a choice was made in 2018 to consider the latest $\gamma$-ray intensities available and obtain $M(E2)$ value for the $2^+ \rightarrow 0^+$ decay in $^{50}$Mn. Here, we consider the current evaluated relative $\gamma$-ray intensities given in NNDC [3], i.e., 100 (9) and 64 (8) for the 149 keV and 800 keV $\gamma$-decays, respectively. This new analysis lowers the data point for $^{50}$Mn given in Ref. [1] by 20% with a value of 28 efm$^2$ as shown in Fig. 1 (green square).

It should be noted that the uncertainties in matrix elements presented in Ref. [1] were higher by a factor of two due to a typo in the manipulation of plots. This is now is corrected in Fig. 1, showing the correct uncertainties.

Figure 1 indicates that the original conclusion drawn in Ref. [1], i.e., the linear $M(E2)$ versus $T_z$ curve for A=50 nuclei, may still be valid for the updated data points with the correct uncertainties and using the evaluated $\gamma$-ray intensities for $^{50}$Mn from NNDC [3]. However, the new data point for $^{50}$Mn (in green in Fig. 1) strongly suggests that the $M(E2)$ versus $T_z$ curve is more likely to be non-linear. This warrants new simultaneous measurements of electromagnetic transition rates in the A=50 triplet using the same experimental setup to eliminate systematic errors and investigate the non-linearity. Such measurements will be crucial to critically assess the level with which isospin symmetry breaking occurs in mass 50 nuclei.

It is worth noting that the data presented in a table and a figure are inconsistent in Ref. [2]. We would like to thank Prof. R. Wadsworth for the discussions prompting this note.

FIG. 1: The matrix element $M_{\text{tot}} (M(E2))$ as a function of $T_z$ for the three $T = 1, A = 50$ isobaric nuclei. Data for $^{50}\text{Mn}$ has been obtained for the first time in 2018 [1]. Here, all the black data points are the same as those presented in Ref. [1] while the green data point for $^{50}\text{Mn}$ is new and corresponds to the updated analysis with branching ratios taken from Ref. [3].