Meson exchange effects in $^{16}N(0^-)\rightarrow{}^{16}O(0^+)$ β decay
− discrepancy solved −

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In order to investigate meson exchange effects in nuclei, the time component of axial vector current (axial charge) in nuclear β decay is an important clue because it is pointed out that the axial charge is enhanced by the meson exchange currents over the impulse approximation by as large as ~ 40 % [1]. The β-decay probability (W_β) of $^{16}N(0^-)\rightarrow{}^{16}O(0^+)$ transition is one of the most suitable observable to extract the axial charge. The several studies on this transition have been carried out [2], but the results have not been in agreement one another, i.e. the result in ref.[3] has been discontiguous from the others. We have searched the origin of the discrepancy and found that one of the ratios of γ-ray intensities used only in ref.[3] to calibrate the efficiency of the detector played an important role. That is a data on intensity ratio of γ rays in ^{28}Si, which is not in agreement with the newer data [4]. We found that the newer data make the result in ref.[3] be in agreement with those in the other studies.

We have remeasured the intensity ratio of 2 γ rays deexciting the 7799 keV level in ^{28}Si and obtained a precise and consistent result with the newer data which leads all the results to being consistent. With these newer data including the present data, the result of the β-decay probability of $^{16}N(0^-)\rightarrow{}^{16}O(0^+)$ transition in ref.[3] has been modified as shown in Fig. 1 to be consistent with other data.

We have also taken a new data on W_β, the preliminary result of which is shown in Fig. 1 to be consistent with all the others. Owing to this consistency, we can take a weighted mean of all the results to get a precise value for the transition probability with an error less than 5 %. This precision is the best among the existing data on $0^- \leftrightarrow 0^+$ transitions. With this value, the mass dependence of enhancement of the axial charge will be discussed with an increased precision, which is related with a renormalization of nucleons in nuclear matter [5].

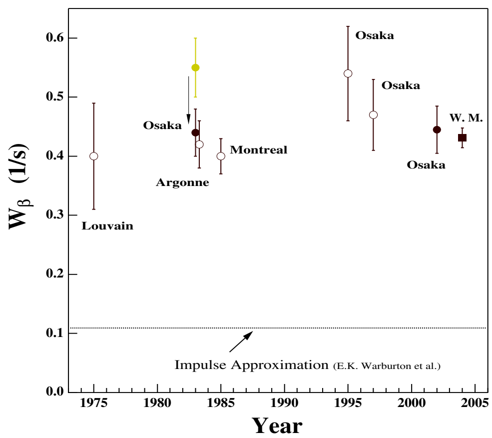

Figure 1: W_β of each group plotted against year. W.M. shows the weighted mean of all data.

References

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