Canadian Penning Trap: Q-Values of Superallowed Beta Transitions

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The collaboration based on the Canadian Penning Trap (CPT) Mass Spectrometer has continued to measure atomic masses related to superallowed β decay. Our result for the Q_{EC} value of ^{46}V, 7052.90(40) keV, which was reported in last year's Annual Report, has recently been published [1]. It was the first Penning-trap measurement of the Q_{EC} value of a "well known" superallowed transition and it disagrees significantly with the previously accepted value of 7050.71(89) keV, a survey result [2] principally based on a 30-year-old measurement [3] of the ^{46}Ti (^{3}He,t) ^{46}V reaction Q-value. Since the Q_{EC} values for all the best known superallowed transitions are currently based on reaction measurements, this raised concern [4] that there could be a previously undetected systematic error in all reaction measurements which, when corrected, might lead to a significant shift in V_{ud} from the value obtained in the survey.

In the past year, the collaboration has measured masses from which the Q_{EC} values for ^{10}C, ^{14}O, ^{26}Al^{m}, ^{34}Cl, ^{38}K^{m} and ^{42}Sc will be extracted. The data are still being analyzed.

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[3] H. Vonach *et al.*, Nucl. Phys. **A278**, 189 (1977).

[4] J.C. Hardy, I.S. Towner and G. Savard, Int. J. Mass Spec. **251**, 95 (2006).