Reply to "Comment on 'Level structure of ^{92}Rh: Implications for the two-proton decay of ^{94}Ag^m'"

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We reply to the preceding Comment.

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The Comment by Mukha *et al.* about our recent publication [1] presents some interesting opinions, but no factual evidence against our conclusions. These conclusions were reached on the basis of both spectroscopic data and a Q-value calculation partially dependent on extrapolated mass excess values. The use of Atomic Mass Evaluation (AME) [2] tables (including their extrapolations) as a basis for our knowledge of the mass surface is a scientifically sound and standard method in our field, as is presenting deviations from the tabulated values. While we completely agree that this issue of the exact values of the mass excess will be finally resolved by new mass measurements, we find it hard to see our paper as "misleading" in using these tabulated values, especially when supported by spectroscopic data. It could be argued that the original article [3] was incomplete, since the authors did not consider the implications of their experiment in the light of the current mass tables.

Until new direct mass measurements are made, there seems to be little new to discuss. We need only point out that for the most plausible case (based on angular-momentum conservation) of two-proton decay from ^{94}Ag^m based on data in Ref. [3], the *difference* between the mass excess values of ^{92}Rh and ^{93}Pd (the only extrapolated values used) must increase by ~2.7 MeV. In this case, the two protons could populate a state (not observed in our data) of 2.947 MeV with a spin of $15\hbar$. This means that the two protons would carry six units of angular momentum, which is the only case consistent with the reported partial half-life of 80^{+110}_{-30} sec, assuming a deformation with an axis ratio of 3:1 [3]. The calculated excitation energy E^* of ^{92}Rh available in the reaction is 0.24(57) MeV, and depends on the difference in mass excess values of ^{92}Rh and ^{93}Pd. We may express the problem thus: $E^*(^{92}\text{Rh}) = [\Delta(^{93}\text{Pd}) - \Delta(^{92}\text{Rh})] + C$, where C represents the other (experimentally known) values used. The excitation energy of their most plausible case is different from the calculated value by $2.947 - 0.24(57) = 2.71(57)$ MeV, the amount of increase mentioned above.

As a side note, we would like to point to a recent experiment with the Canadian Penning Trap Spectrometer at Argonne National Laboratory [4] produced a preliminary result for the mass excess of ^{92}Rh. This result is within the range of the AME value, with an experimental uncertainty ten times smaller than the uncertainty of that value. A recent experiment at Jyväskylä [5] confirms our analysis on basis of ^{92}Rh and ^{94}Pd mass excesses, and in fact states an even lower excitation energy of ^{92}Rh accessible by the two-proton decay.

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