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Jędrzej Iwanicki
Heavy Ion Laboratory,
Warsaw University

Dennis Mücher,
Institut für Kernphysik,
University of Cologne

Letter of clarification to the

ISOLDE - Neutron Time-of-flight Committee

We are writing to clarify doubts around our proposal INTC-P-210 submitted before the previous INTC meeting in May 2006. The proposal suggested a feasibility of Coulomb Excitation measurement of the electromagnetic properties of the unstable ^{94}Kr nucleus.

Presented proposal demonstrates the possibility of observing Coulomb Excitation of the first excited 2^+ state of this nucleus. Data collected during an experiment shall most probably be sufficient to derive the reduced E2 matrix element of the related $2^+ \rightarrow 0^+$ transition and a slight chance to achieve an experimental sensitivity to the diagonal E2 matrix element of the 2^+ state was mentioned.

The proposed experiment should be understood as a contribution to systematic measurements of reduced transition probabilities in the neutron-rich krypton chain and as a first step towards possible experimental shape determination giving basic results for a future measurements. These would employ wider variety of beam energies and target masses. Further beam intensity increase would be the most desirable improvement of experimental opportunities.

To be more specific, we want to show the results of theoretical calculations assuming the same value of transitional $\langle 2_1^+ \| \mathrm{E2} \| 0_{gs}^+ \rangle$ matrix element (0.44 eb) and a bit optimistic value of diagonal $\langle 2_1^+ \| \mathrm{E2} \| 2_1^+ \rangle$ matrix element based on rotational model assumption (-0.52 eb). Putting this positive one may calculate the 2^+ state population cross section and compare it to the original result for the negative value. This is a measure of a pure sensitivity to the diagonal matrix element and was plotted on Figures 1. and 2. below.

As it can be noted, while the relative sensitivity to the absolute value of diagonal matrix element seems to have a peak in the intermediate beam energies around 230 MeV, higher beam energies are favoured due to higher counting rates.

Whereas obtained theoretical counting yields and sensitivities are encouraging, there are many effects (absolute values of matrix elements, their correlations, radioactive random coincidence background etc.) that are limiting our expectations. Therefore we believe that whilst diagonal matrix element is within easy reach, reality may be cruel and frustrate our desire to measure the diagonal matrix element of the 2^+ state.

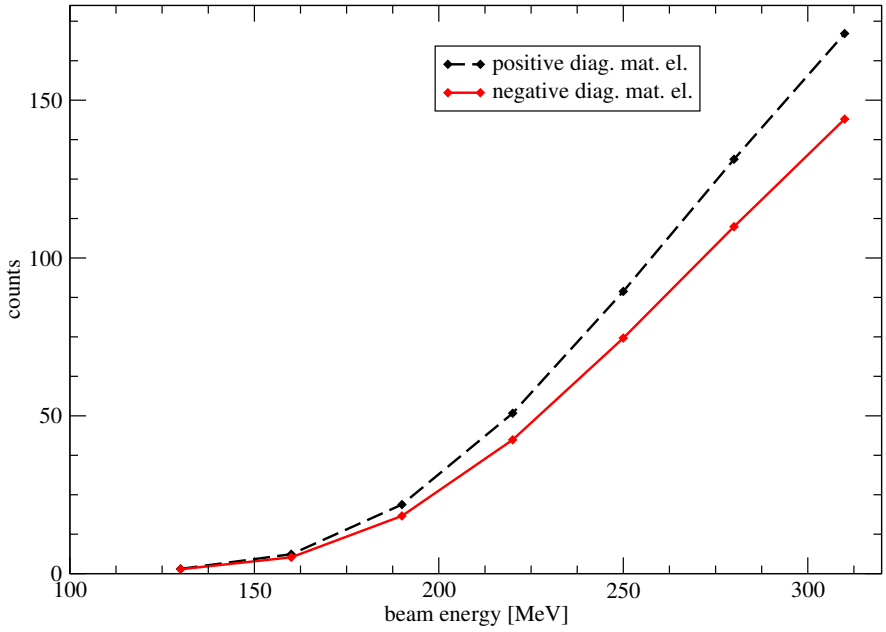

Figure 1: Counts per hour expected in the $2^+ \rightarrow 0^+$ line for positive and negative value of the diagonal matrix element as a function of beam energy. 2 mg/cm^2 ^{108}Pd target is assumed.

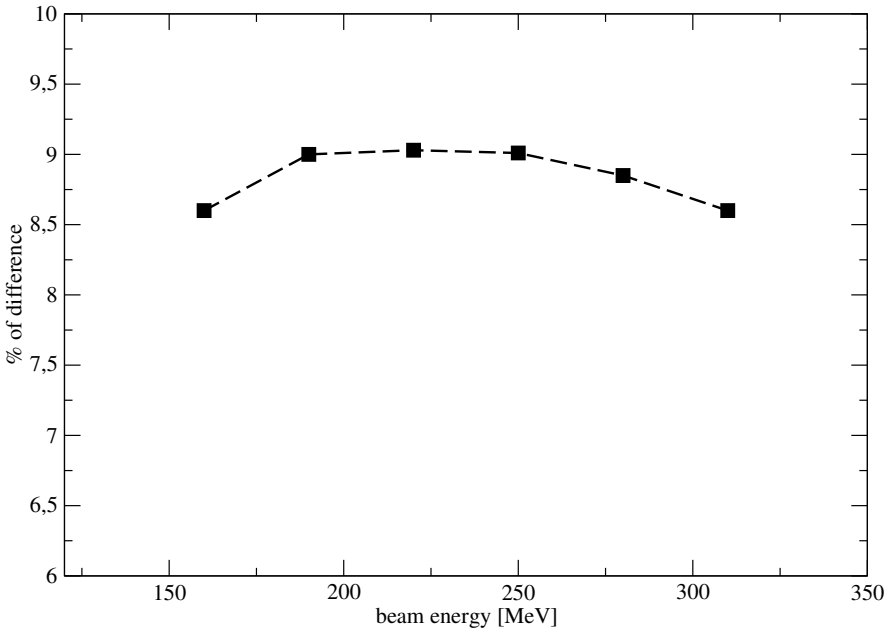

Figure 2: Difference-to-yield ratio $\left(\frac{Y^+ - Y^-}{Y^+ + Y^-} \times 100\%\right)$ resulting from the data presented in previous figure