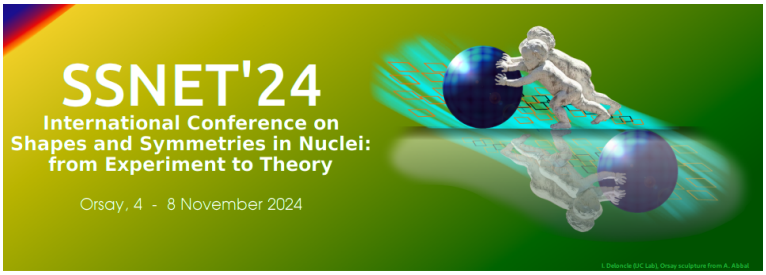

ID de Contribution: **70** Type: **Non spécifié**

Observation of isomer depletion of Mo-93m in HIRFL

mardi 5 novembre 2024 12:45 (20 minutes)

Nuclear Excitation by Electron Capture (NEEC) was predicted by Goldanskii and Namiot as the the inverse process of internal conversion in 1976[1]. It was predicted to play an important role in the isomer depletion, which is a potential path for releasing nuclei energy stored in isomer[2].
The first experimental observation on NEEC was reported in the slowing down process of ^{93m}Mo[3]. The observed isomer depletion probability was too large to be reproduced by Coulomb excitation, and thus attributed to NEEC. However, it also failed to be reproduced by NEEC in the following theoretical works[4,5].
On the experimental side, a comment was addressed on the influence of complex γ background which may cause the overestimation of isomer depletion probability[6]. Later, an independent experiment was performed using a ^{93m}Mo secondary beam, but no isomer depletion was observed with an accuracy of 2×10^{-5}, which was reported as the upper limit of the excitation probability[7]. However, this measurement was performed with lower recoiling energies than the previous experimental work.
Now, a new experiment has been performed with higher recoiling energy and purity of the ^{93m}Mo isomer beam in the Heavy Ion Research Facility in Lanzhou. Both lead and carbon foils were used to stop the ^{93m}Mo ions. Isomer depletion is observed, and the excitation probability is about 2×10^{-5} for lead, and 2×10^{-6} for carbon. These results agree well with the calculated probabilities for inelastic reactions, which are thus suggested to be the main mechanisms exciting the ^{93m}Mo isomer during its stopping process.

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