

Update on improving the fission-product yields of ^{147}Nd , ^{156}Eu and ^{111}Ag

D. Melconian, V.E. Iacob, J. Clark,¹ G. Savard,¹ D.E.M. Hoff,² K. Kolos,²
N. Scielzo,² and M.A. Stoyer²

¹Argonne National Laboratory, Lemont, Illinois

²Lawrence Livermore National Laboratory, Livermore, California

We have submitted a manuscript to Phys Rev C on the ^{147}Nd gamma-ray branching ratios, which was favorably received; it should be published in the next few weeks after we finish addressing the referee comments. Looking ahead, we have high-quality data on the gamma-ray branching ratios of ^{111}Ag and ^{156}Eu . The collaboration decided to pursue completing the analysis of the ^{156}Eu in parallel with analyzing the ^{111}Ag results. Currently, the values for the branching ratios of ^{156}Eu from the most recent evaluation [1] have uncertainties of ranging from 7-14% for the 10 most intense γ rays and up to 30% for the weaker ones. The analysis is proceeding well, however it is difficult due to the sheer number of transitions (~ 100). Fig. 1 shows the gamma spectrum (in coincidence with a detected beta particle), where all of the observed peaks are attributed to ^{156}Eu except for the one small $^{99}\text{Mo}/\text{Tc}$ contaminant peak labelled in the plot. Initial results indicate we will greatly improve the precision of the decay properties.

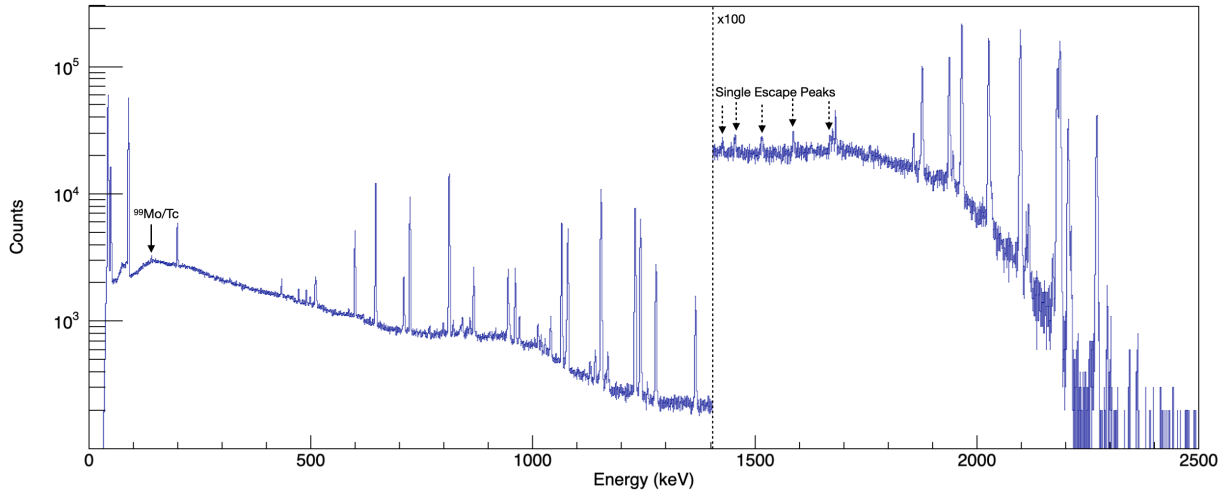


FIG.1. The total γ -ray spectrum from the sample of ^{156}Eu observed during the experiment. The indicated transition show the impurity $^{99}\text{Mo}/\text{Tc}$ observed during the second run. All other lines are attributed to the decay of ^{156}Eu .

As an example, our preliminary result for the most intense branch (1153.67 and 1154.08 keV, two transitions we are not able to resolve with our HPGe) is 11.39(12)%, over 5x more precise than the current 11.5(7)%. We will improve the second most intense transition (811.7 keV) from 9.7(8)% to 9.75(8)%, an order of magnitude improvement.

We expect to submit the ^{156}Eu results by fall of 2024 and then will proceed with completing the ^{111}Ag data.

- [1] C. Reich, Nuclear Data Sheets **113**, 2537 (2012).
- [2] A. F. Kluk, Phys. Rev. C **10**, 1451 (1974).
- [3] Y. Iwata, Journal of the Physical Society of Japan **49**, 2114 (1980).