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β-decay studies of A = 107 nuclei using the Modular Total Absorption Spectrometer (MTAS)

Determination of the true feeding intensities (Iβ) in β -decay of fission products is very important in addressing the reactor antineutrino anomaly and modeling the reactor decay heat. β -decay mea- surements with high-resolution but low-efficiency detectors may affect by the Pandemonium effect. This effect may lead to underestimation of the feeding to high excited levels, thus systematically biases the calculation of reactor antineutrino spectrum and decay heat calculation.
Modular Total Absorption Spectrometer (MTAS), which has almost 99% gamma detection effi- ciency, is an ideal spectrometer to determine not only the true β feeding intensities free from Pande- monium effect, but also the intensity of ground state to ground state feeding. MTAS has been utilized to measure the beta decay pattern of several fission products that are high-priority contributors to re- actor decay heat and antineutrino spectrum.
In this talk, we will present some preliminary results of A = 107 decays measured at CARIBU (ANL) in March, 2020. The β-branchings of 107Tc and 107Mo, which have incomplete data in current nuclear dataset, is determined experimentally using MTAS. We found the Pandemonium Effect in the β-decay measurements of 107Tc and 107Mo. Plenty of new levels with high excitation energy are required to reproduced the experimental spectra. This suggests a large shift of the antineutrino spectrum of 107Tc and 107Mo towards lower energy.

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