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## Primary Gamma Transitions in $^{176}\text{Lu}$ and $^{177}\text{Lu}$ after Resonance Neutron Capture

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$^{175, 176}\text{Lu} (n, \gamma) ^{176, 177}\text{Lu}$  reactions were studied via radiative capture of resonance neutrons at the CSNS Back-n White Neutron Source. Using the time-of-flight (ToF) technique, gamma-ray spectra for isolated resonances were measured. The experiment was conducted with a coaxial HPGe gamma detector equipped with an anti-Compton system, positioned 20 cm from the target. A 60 g sample of metallic natural lutetium ( $^{\text{nat}}\text{Lu}$ ) with 99.9% purity (dimensions:  $60 \times 2.2$  mm) was used as the target, located 76 m from the spallation target in the ES#2 experimental hall. The ToF spectrum was measured in the 1–700 eV energy range, with sufficient  $\gamma$ -ray statistics up to 100 eV. The measurement time was approximately 200 hours. The ToF resolution enabled the extraction of gamma-ray spectra from 16 neutron resonances for the  $^{175}\text{Lu} (n, \gamma) ^{176}\text{Lu}$  reaction. Due to the low natural abundance of  $^{176}\text{Lu}$  (2.6 %), gamma-ray spectra were obtained from 10 resonances for  $^{176}\text{Lu} (n, \gamma) ^{177}\text{Lu}$  reaction. In total, 40 primary gamma transitions were identified for  $^{176}\text{Lu}$ , but 15 for  $^{177}\text{Lu}$ . Resonance spins were also deduced from the analysis of gamma-transition intensities for both reactions.

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