

Identification and quantification of special nuclear material is an important objective for nuclear nonproliferation, security, and safeguards applications. However, many currently deployed nuclear detection systems utilize passive detection techniques unable to detect shielded radioactive material, and most active interrogation methods under development cannot distinguish between fissionable isotopes. Neutron resonance analysis is an isotopically sensitive technique with significant potential for both detecting and characterizing special nuclear material. Although isotopic composition analysis using neutron resonances has been around for decades, recent advancements in portable neutron generators have made possible development of a portable neutron resonance analysis setup for on-site applications. Our group has previously developed a compact experimental setup for neutron resonance transmission analysis, utilizing a portable D-T neutron generator with an epithermal neutron moderator-multiplier assembly, a 2-meter flight path, and shielded  $^6\text{Li}$  glass scintillator detector. Previous results demonstrated the feasibility of using portable neutron generators to detect nuclear material and identify the presence of individual isotopes of interest via analysis of neutron resonance transmission spectra. Recent improvements to the experimental setup have reduced measurement time and increased system resolution. Furthermore, a better fit of experimental results to calculated transmission spectra on a new detector assembly was achieved through the improved background correction methods. Experimental neutron resonance transmission spectra of uranium and plutonium targets with and without low-Z and high-Z shielding will be discussed to show the impact of shielding on isotope identification. Techniques for isotope identification and quantification of targets of unknown isotopic composition will be presented. Applications for portable neutron resonance transmission analysis in safeguards and arms control scenarios will be discussed.