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DEPARTMENT OF MECHANICAL,
AEROSPACE, AND NUCLEAR ENGINEERING

High-Resolution Neutron Cross-Section Measurements At ORELA

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Over the last three decades the Oak Ridge Electron Linear Accelerator (ORELA) has produced many neutron-induced cross-section data. ORELA is the only high-power white neutron source with excellent time resolution still operating in the USA and is ideally suited for experiments to measure neutron fission, total, (n,α) , and capture cross sections in the energy range from 1 eV to as high as several MeV. Recent measurements include neutron capture measurements on $^{39,41}\text{K}$, $^{35,37}\text{Cl}$, F, Mn, $^{58,60}\text{Ni}$, ^{53}Cr , natural Cr, ^{48}Ti , natural Ti, and ^{95}Mo and total cross-section measurements on natural Cl, natural K, ^{95}Mo , Mn, ^{53}Cr , natural Cr, ^{48}Ti , natural Ti, and $^{64}\text{Zn}(n,\alpha)$.

Many of these measurements were carried out to support the U.S. Nuclear Criticality Safety Program (NCSP). Concerns have been raised about many of the older nuclear data evaluations important for criticality safety. For example the time-of-flight resolution and accuracy of some of the existing data are too poor for new evaluations and thus applications. Several of these data are also important input parameters for the ongoing nuclear astrophysics program, which investigates the s-process nucleosynthesis in Asymptotic Giant Branch stars. Here the Maxwellian-averaged neutron-capture cross sections at $kT = 8$ and 30 keV are of importance.

This talk provides an overview of the high-resolution cross-section measurement facility ORELA and describes the current measurement activities.

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