

The MicroCALDERA Project:

Active-Target Microcalorimeters for Nuclear Data

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The MicroCALorimeter DEmonstrator for Reactions on Actinides (MicroCALDERA) project is a newly funded Laboratory Directed Research and Development project at Los Alamos National Laboratory. The goal of this project is to develop active-target microcalorimeter detectors suitable for neutron beamline experiments and demonstrate microcalorimeter-based measurements of neutron-scattering reactions. Active-target microcalorimeters are uniquely capable of measuring low-energy internal conversion signals in actinide targets, signals that will be heavily attenuated with traditional techniques. Success gives us a path to precision differential measurements of elusive reactions like $^{239}\text{Pu}(n,n')$, which was first identified as a nuclear data need more than 80 years ago.

Future arrays of microcalorimeter detectors with actinide-loaded absorbers have the potential to measure poorly-known cross sections like $^{239}\text{Pu}(n,n')$ at the Los Alamos Neutron Science Center to better than 10% in a weeklong experiment. Measurement of the angular distribution of scattered neutrons should be possible via unfolding of the inelastic scattering peak and recoil nucleus kinematics. If successful, this project will demonstrate the capability of microcalorimeter detectors to address missing neutron-induced nuclear data on more than 55 elements that have stable or long-lived isotopes.