



U.S. Department of Energy

Elastic/Inelastic Measurement Project

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Program: Advanced Fuels

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ABSTRACT

The advanced fuels program sponsors research and development of innovative next generation light water reactor (LWR) and future fast systems. Input needed for both design and safety considerations for these systems includes neutron elastic and inelastic scattering cross sections that impact the fuel performance during irradiations, as well as coolants and structural materials. The purpose of this project is to measure high precision and accurate nuclear data requested by the Advanced Fuels program for elastic/inelastic scattered neutrons on coolants and structural materials important for the development of future systems. The high-precision requirements identified in the campaign supported by nuclear data sensitivity analyses have established a high priority need for precision elastic/inelastic nuclear data on the coolant ^{23}Na and the structural materials ^{54}Fe and ^{56}Fe . The nuclear data files used in advanced fuel cycle codes are a culmination of available experimental data and nuclear theory, combined to provide the best estimates of not only the central values but also the uncertainties in covariant form. In order to deliver new high-confidence nuclear data to design codes, supplemental nuclear data from the proposed measurements will be delivered to evaluators at national laboratories to be included in updated nuclear libraries.

A consortium of three universities and a national laboratory has been formed to provide the necessary breadth for this effort and includes a list of scientists with extensive experience in neutron elastic and inelastic scattering measurements and with direct access to the facilities for completing the proposed neutron measurements. This three-year project, which will integrate closely with the Nuclear Physics Working Group, will not only provide partial support for faculty and staff, but training in neutron physics will be given to six to ten university undergraduate students, a graduate student, and a postdoctoral scholar, thus helping address the nation's need to improve the nuclear science and engineering infrastructure so the industry will be prepared for future expansion.