

Recent Advances in Resonance Region Nuclear Data Measurements and Analyses for Supporting Nuclear Energy Applications

M. E. Dunn

Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6170 USA

Submitted to the Mini-Symposium on Nuclear Physics Research Connections to Nuclear Energy at the Division of Nuclear Physics Meeting in Oakland, CA (October 23–26, 2008)

For more than 30 years, the Oak Ridge National Laboratory (ORNL) has performed research and development to provide more accurate nuclear cross-section data in the resonance region. The ORNL Nuclear Data (ND) Program consists of four complementary areas of research: (1) cross-section measurements at the Oak Ridge Electron Linear Accelerator (ORELA); (2) resonance analysis methods development with the SAMMY R-matrix analysis software; (3) cross-section evaluation development; and (4) cross-section processing methods development with the AMPX software system. Overall, the ND Program is tightly coupled with nuclear fuel cycle analyses and radiation transport methods development efforts at ORNL. As a result, resonance region measurements and evaluations are performed in concert with nuclear science and technology needs and requirements. Since the mid 1990s, many of the resonance region advances have been driven by needs within the Nuclear Criticality Safety Program of the U.S. National Nuclear Security Administration. For example, assessments of previous nuclear data measurements and evaluations have revealed deficiencies in nuclear data (e.g., missing resonances, high neutron sensitivity, etc.) that are important for nuclear applications. As a result, new measurements and evaluations have been performed to address the nuclear data deficiencies. Recent advances in each component of the ORNL ND Program have led to improvements in resonance region measurements, R-matrix analyses, cross-section evaluations, and processing capabilities that directly support radiation transport research and development. Of particular importance are the improvements in cross-section covariance data analysis and evaluation capabilities coupled with covariance processing improvements. The benefit of these advances to nuclear science and technology research and development will be discussed during the symposium on Nuclear Physics Research Connections to Nuclear Energy.