HIGH ENERGY NUCLEAR DIFFERENTIAL SCATTERING MEASUREMENTS FOR BERYLLIUM AND MOLYBDENUM

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Abstract

At the Rensselaer Polytechnic Institute Gaerttner LINAC Laboratory, a system for high energy (up to 20MeV) neutron scattering measurements, using time-of-flight (TOF) methods, has been developed. An array of proton recoil detectors surrounding the sample placed at 30.1 meters from the source measures the scattered neutron flux. This system has been used for measurement of the differential scattering yield of beryllium and molybdenum normalized a graphite standard. A state of the art, all digital, data acquisition system has been employed in the collection, analysis, and storing of all TOF data. Sophisticated software was developed to perform pulse shape analysis, multi-channel analyzer (MCA) functions, and TOF analysis on the raw data and generate angular dependent scattered neutron distributions free from gamma contamination. The experimental data for beryllium collected with this system shows good agreement with the latest nuclear data file, ENDF/B-VII.0. In addition, the results for molybdenum show the improvement of ENDF/B-VII.0 over nuclear data scattering evaluations. ENDF/B-VI.8. The system provides valuable data to benchmark and improve the nuclear data scattering evaluations.