NEUP Nuclear Energy University Programs
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Nuclear Engineering and Science Equipment for Research and Education in the Nuclear and Radiological Engineering Program at the Georgia Institute of Technology

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ABSTRACT:
The Nuclear and Radiological Engineering (NRE) Program at the Georgia Institute of Technology proposes to strategically enhance its academic and research capabilities in the area of nuclear engineering x-ray imaging and neutron dosimetry. The focus of these enhancements will be in the x-ray imaging and irradiation facility and its supplemental instrumentation and neutron dosimetry laboratory. In keeping with the Department of Energy's mission and the recent DOE-FOA-0001130 RFP, this proposed expansion of capabilities will target fuel, reactor-related materials, thermal-hydraulic research and nuclear power plant-related neutron dosimetry fields. While promoting cutting edge research, our approach also seeks to address several critical areas, specifically, the need to 1) enhance student understanding of the nuclear materials and thermal hydraulic analysis through imaging; 2) improve the tools and techniques used in such analysis; and 3) expand education and training for students and personnel in the areas of nuclear materials science, thermal hydraulics, imaging and its links to nuclear detection, 4) expand the research and education capabilities in neutron fields and dosimetry analysis.

To achieve these objectives, we have identified key equipment and instrumentation to augment our current academic offerings and support development of additional avenues for education, training, R&D, and collaboration with industry and national laboratories. These are 1) installation of an imaging system to go along with the existing x-ray source in a fully equipped irradiation laboratory, 2) addition of spectroscopic instruments to perform energy resolution measurements in supplement of imaging, and 3) addition/expansion of dosimetry capabilities by adding tissue equivalent proportional counters (TEPC) to the neutron spectral and dosimetric instruments for improved characterization of the neutron and mixed fields. The proposed equipment and instrumentation will substantially enhance both the academic and research capabilities. The proposed imaging, radiation detection and dosimetry instrumentation, and the renewed emphasis on advanced materials and fluid characterization methods will enhance education, training, and research opportunities related to the analysis of nuclear reactor. Moreover, to address gaps in graduate and professional training, these facility improvements constitute essential infrastructure upgrades needed for investigating new protocols for materials characterization and analysis, supporting graduate training in nuclear imaging and detection and can assist in training and education of laboratory techniques applied in advanced neutron dosimetry. It is especially important that these skills be emphasized, as they play a pivotal role in nuclear engineering and advanced plant designs.