

Instrumentation in Support of the Michigan Advanced Nuclear Imaging Center (MINIC)

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Program: General Scientific
Infrastructure

ABSTRACT: We propose to significantly upgrade the University of Michigan’s capabilities to perform high-resolution, high-contrast imaging for nuclear applications, including the X-ray, gamma, neutron, and infrared modalities. Our baseline facilities include the Neutron Science Laboratory (NSL), directed by Prof. I. Jovanovic, and the Experimental and Computational Multiphase Flow Laboratory (ECMF), co-directed by Prof. A. Manera and Dr. V. Petrov. The overall vision for this upgrade is to lay groundwork for a future multi-disciplinary University of Michigan Advanced Nuclear Imaging Center (MINIC) that will combine the capabilities and expertise of NSL and ECMF to address a broad range of applications requiring advanced high-resolution imaging. These include nuclear power, nuclear security, nuclear medicine, advanced materials and devices for energy storage, and fundamental discovery science. The grant will enable the development of new detectors, detection systems, and techniques for fast neutron and gamma detection and imaging, as well as expand the laboratory capabilities to include advanced high-speed X-ray imaging, high resolution distributed temperature sensors, and high resolution profile velocimetry sensing for application in liquid metals and other fluids. This coherent integration of our current facilities and capabilities will not only serve the existing research activities, but also provide novel measurement capabilities to support future R&D aligned with the nuclear energy research needs. Further, MINIC will present opportunities for new external collaborations and for engaging external users. MINIC will provide unique capabilities complementary to NSUF. The infrastructure will further improve and extend the educational program for nuclear engineers at the University of Michigan, serving a large number of graduate and undergraduate students. The total budget for the project is \$440,650. \$300,000 of this total budget is requested from the Department of Energy, while \$140,650 will be provided by the University of Michigan through a combination of PI startups and institutional cost share.