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## **University Reactor Upgrades Infrastructure Support for the MITR Research Reactor's Nuclear Instrumentation**

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**Project Director/Principal Investigator:** John A. Bernard, Principal Research Scientist

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**ABSTRACT:**

**Objective:** The objective of this proposal is to improve reactor safety and operational reliability by procuring and installing new instruments (electronics and detection elements) for two of the four nuclear instrumentation channels that are used to monitor and control the reactor power level.

**Description:** Funds of \$499,640 are requested to procure two Mirion DAK-250-g intermediate power range monitors together with two NY10887GR2 fission chambers, two TKV23.11 wide-range pre-amplifiers, and the requisite acceptance testing/ documentation/ on-site training needed for the installation of these units. These instruments will replace two aging nuclear channels that are used for (1) monitoring of the reactor power from shutdown to full operating, and (2) automatic control of reactor power so as to maintain the reactor at a steady operating point despite xenon and other slow transients.

**Relevance and Outcomes:** The MIT Reactor's nuclear instrumentation consists of ten separate channels with each channel comprised of both the electronics and a detection element. Six channels are used for the nuclear safety system (power level and period scrams), three for monitoring and control, and one (linear N-16) that provides an indirect confirmation of reactor power by monitoring the nitrogen -16 radiation that is associated with the primary coolant. The safety system channels have been upgraded as the result of previous DOE-NEUP funding. The requested funding will allow upgrading of two of the four control/monitoring channels. At present, these channels are subject to frequent repair, use detection elements that are borrowed from experimenters, and are not compatible with each other or with the safety system. The proposed Mirion instruments would be fully compatible with the new safety system and greatly improve the console operator's ability to monitor the power level. This would in turn make the facility both more reliable and safer.