AT A GLANCE

What is it?
The harsh radiation environment of space presents a challenge to new technology, often only developed for terrestrial uses. The SIRI instrument is designed to test the performance of new gamma-ray detector technology for space-based applications, offering improved energy resolution, lower power consumption and reduced size.

How does it work?
SIRI consists of new europium-doped strontium iodide (SrI2:Eu) scintillator technology developed for terrestrial-based weapons of mass destruction (WMD) detection. Instead of bulky photomultiplier tubes, SIRI also utilizes low power, space-saving, silicon photomultiplier (SiPM) technology. The combined detector and readout measure the gamma-ray spectrum over the energy-range of 0.04 - 8 MeV.

What will it accomplish?
Space-qualify and characterize a new radiation detector technology for use in military and civilian applications.

Space Science Division (SSD)
The SSD's focus is to discover, develop, and demonstrate innovative technologies, methods, and products that are needed to ensure robust access to space-associated capabilities of critical importance. The Division combines assimilative environmental specification and forecast models and related optimized suites of remote and in situ sensors, with scientific theory and analysis, and operationally derived performance metrics, to increase technology readiness and foster transition.

Objectives: The primary goal of the SIRI program is to space-qualify new europium-doped strontium iodide (SrI2:Eu) detectors and silicon photomultiplier (SiPM) technologies. This includes studying the internal activation of SrI2:Eu in a space radiation environment and measuring the performance of the SiPM readouts over the one-year mission life. During that time, the instruments will also study transient astrophysical phenomena, such as gamma-ray bursts and solar flares.

SSD Approach: The Naval Research Laboratory is the lead institution for the SIRI program. Both instruments use the new scintillator material SrI2:Eu for gamma-ray detection. The SIRI-1 instrument consists of a single small detector and is focused on studying the short and long term effects of the harsh environment. The SIRI-2 instrument tests an array of 7 large detectors, with a significantly larger collection area, and is representative of an operational configuration. Both systems are capable of gamma-ray spectrometry with 4% energy resolution at 662 keV.

Payoff: A space-qualified new material that provides 2x better performance than currently-used DoD scintillator technology, and new readout technology that offers significant Size, Weight, and Power reduction versus current photomultiplier technology. These improvements provide better source identification and detection sensitivity.

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