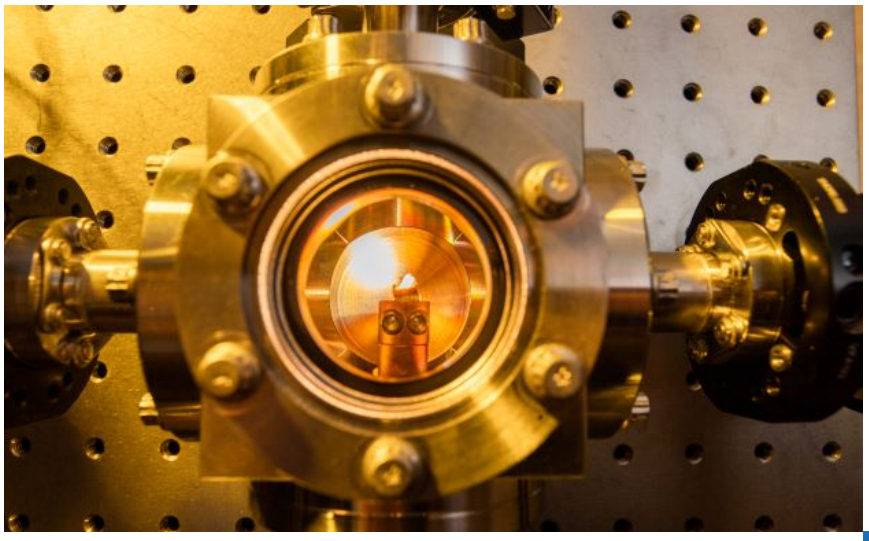

Los Alamos NATIONAL LABORATORY

Tech Snapshot

Chemistry

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# FABIA: FIELDABLE ATOMIC BEAM ISOTOPIC ANALYZER

## SUMMARY

Many countries use nuclear reactors to generate energy, and those reactors rely mostly on uranium. Agencies across the world inspect enrichment plants to ensure uranium is being enriched only enough for nuclear energy purposes. However, current analysis methods, such as radiation isotope identification devices (RIIDs), take weeks to offer results. The Fieldable Atomic Beam Isotopic Analyzer (FABIA), developed at Los Alamos National Laboratory, is a portable instrument capable of real-time, isotopic analysis. FABIA uses high-resolution absorption spectroscopy in an atomic beam to enable users to identify the composition of a sample material rapidly and accurately. This technology eliminates the need for sample preparation and reduces waste, while delivering accurate analysis of a variety of compositions. Los Alamos is now seeking partners to license the technology for commercial use.

## MARKET APPLICATION

The global market for RIIDs continues to diversity in its applications and is expected to grow significantly between 2022 and 2028. Compact optical spectrometers meet the need for in-line, in-the-field, and point-of-use measurements. This is indicated by the high growth of the compact spectrometer systems market which now exceeds $1 B. While this is still less than 10% of the overall global spectroscopy market, the annual growth rate for compact spectrometer systems is three times higher than the 6% total market CAGR. The various market sectors for isotope identification equipment that are expected to grow and diversify outside of energy generation include border control and customs, emergency first response, environmental waste surveillance, medical physics, freight monitoring, state and local government and transportation and shipment ports.

## BENEFITS

FABIA's portability and simplicity aids global security, energy production and medical isotope production.

- Provides isotope determination with high sensitivity and resolution in several minutes
- Portability enables detection of isotopes in field environments
- Eliminates sample preparation and waste generation
- Delivers automated, accurate analyses of a variety of samples

## CONTACT

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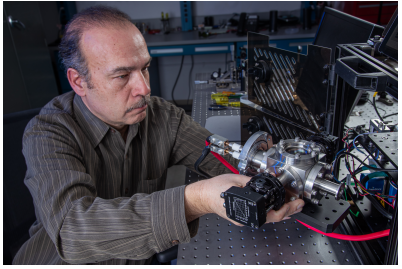

## WHY WE ARE BUILDING FABIA: FIELDABLE ATOMIC BEAM ISOTOPIC ANALYZER

Los Alamos researchers initially developed FABIA as a method and instrumentation for the isotopic analysis of nuclear materials in the field. This analysis is usually conducted by mass spectrometry, which requires sizable instrumentation and a large support infrastructure. FABIA provided researchers a portable means for isotopic analysis.

## WHAT'S BEHIND OUR TECHNOLOGY

FABIA directly detects laser absorption for individual isotopes; eliminating the requirement of a radiation signature, as it only depends on isotope concentration. The sample is vaporized by a heater and then the vapor stream crosses a laser path. When absorption occurs, the wavelength of the laser indicates what isotope is present, and the change in light intensity indicates the concentration of isotopes present. Optical filters and dual beam configurations can be implemented to improve detection specificity and sensitivity.

## OUR COMPETITIVE ADVANTAGES

Most schemes to detect special nuclear materials (SNM) use a device that can induce fission from an external neutron source and measure the resulting radiation, such as an RIID. However, some RIIDs cannot detect SNM isotopes that emit only low-energy gamma rays, especially if they are shielded by lead or other materials. Mass spectrometry cannot be applied to mixtures of certain elements, such as uranium and plutonium, because some of the isotopes have the same mass (e.g., U-238 and Pu-238). FABIA, being based on a completely optical method, can identify isotopes shielded by other materials and does not suffer from limitations of mass spectrometry. FABIA is a simple, ruggedized instrument, well suited for field applications.

## OUR TECHNOLOGY STATUS

Los Alamos researchers have built a portable prototype and field tested it at a UF6 plant at the Pacific Northwest National Laboratory. Los Alamos is seeking for partners interested in licensing the technology.

## PUBLICATIONS AND IP

Disclosure (#4771)