**Title:**  
**Gamma Rays Open New Frontiers in Nuclear Energy and Space Exploration**

**Subtitle:**  
**Experimental research in gamma-ray spectroscopy reveals progress in radiation shielding and material identification**

A series of experiments using gamma-ray spectroscopy is unveiling new possibilities for the safe use of nuclear energy and the advancement of space technologies. Conducted in an academic setting and presented in the paper *Gamma Rays in Nuclear Physics: Research and Applications*, the study focused on precise calibration of radiation detectors and the behavior of various materials under high-energy gamma radiation.

The first phase involved calibrating detectors with known isotopes such as Cesium-137, which emits a distinct gamma-ray at 661.7 keV. Accurate calibration is essential for identifying energy peaks and ensuring reliability in subsequent experiments.

Next, researchers simulated nuclear fuel rods by testing how materials like lead, copper, brass, aluminum, plastic, and wood attenuate gamma radiation. As expected, lead was the most effective, but surprisingly, plastic—despite being much lighter and thinner—showed attenuation levels close to aluminum, pointing to promising applications in weight-sensitive environments.

This unexpected performance opens the door to using polymers in settings where weight reduction is critical, such as spacecraft and interplanetary probes. The potential of plastic for radiation shielding, coupled with its light weight, could lead to practical solutions for protecting equipment and crew in high-radiation zones.

Another key aspect of the study was identifying unknown materials through their linear attenuation coefficients and densities. One sample, with graphite-like features, matched the properties of beryllium—a lightweight yet effective radiation absorber. A metallic cylinder with magnetic properties and a silver appearance was identified as a samarium-cobalt alloy, commonly used in high-performance permanent magnets.

These findings confirm the accuracy and reliability of gamma-ray spectroscopy for material characterization. According to the authors, the results directly support the development of lighter and more efficient shielding systems—crucial for space missions like NASA’s Kilopower project, which seeks to power exploration with compact nuclear reactors.

Beyond space applications, the methods can be applied in nuclear security, medical imaging, and industry, where rapid and precise identification of radioactive materials is vital. This research highlights how experimental physics, combined with materials innovation, can offer practical solutions for both terrestrial and extraterrestrial challenges in nuclear science.

**RESPONSIBLE AGENCY:**

Lívia Aragão  
livia@mccomm.com.br   
https://www.agenciamccomm.com.br