Testing Cost Effective Scintillators for the Strip PET Scanner

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A positron emission tomography (PET) scan is a popular imaging device that helps reveal regions of high metabolic activity correlating to cancerous areas in the body. This procedure involves a patient ingesting a radioactive tracer followed by detection of tracer's breakdown. While these detectors, conventionally made of inorganic scintillation crystals, are effective and accurate; they place a costly burden on the patient and provider alike. Thus, the current study aimed to redesign the current PET scanner to make it a more rapid, compact and cost effective, imaging device. The redesign is based on strips of plastic scintillation crystals, known as Bicron, arranged in a barrel formation. The objective of my research is to present a characterization of the effectiveness of Bicron, specifically Bicron-408, in response to different radioactive sources. The proposed use of Bicron-408 is expected to be more cost effective and will have superior time efficiency properties. The energy distributions and position graphs showed that Bicron-408 had an effective and accurate response to the ionizing radiation. Ultimately, I concluded that Bicron-408, is a suitable option for the strip PET detector design. In the future, I would like to test different types of Bicron and compare cost effectiveness with energy resolutions. If the strip PET scanner is implemented widely once it is built and tested, it could save thousands of dollars in medical imaging, be integrated within an MRI and be transported to Third World countries. Although it's not the scope of my current work, I am in the process of exploring the implementation of Bicron-408 as a detector for instruments outside the medical imaging field, such as in Homeland Security and Naval technology fields.

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