Preliminary Testing of Neutron Defectoscopy System

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Abstract. A new neutron defectoscopy device is currently being tested. It consists of a plastic scintillator and an astro-camera that captures the scintillator's response to radiation. For the initial tests, an AmBe neutron radioisotope source was used. Because the AmBe source emits gamma radiation, it is ideal for determining the plastic scintillator's sensitivity to both types of radiation. Therefore, the attenuation of radiation in different materials with different thicknesses was determined. Theoretically, materials with light atoms, such as hydrogen, should scatter neutrons more, while gamma radiation shouldn't be affected at all. On the other hand, materials with heavier atoms, such as lead, should attenuate gamma radiation more compared to neutrons. This way, we can determine which materials are better for image quality since we cannot completely eliminate gamma's contribution to the captured image. In this study, we performed several experiments and captured images for different types of materials. Based on the brightness of shielded to unshielded area the attenuation capabilities of each material were determined. Then a correlation between the neutron and gamma radiation was found captured in an image for a specific material of a given thickness.