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$CdWO_4$ and CsI Crystal Detectors ALYSSA DAY, DONGMING MEI, YONGCHEN SUN, KEENAN THOMAS, OLEG PEREVOZCHIKOV, University of South Dakota, UNIVERSITY OF SOUTH DAKOTA TEAM — $CdWO_4$ scintillators were proposed for detecting geo-neutrino, neutrinoless double-beta decay, and dark matter. I used the energy resolution of three different sized $CdWO_4$ crystals for detecting γ-rays. The three crystals had diameters of 19mm but thicknesses of 5mm, 9mm, and 19mm. In using the 19mm $CdWO_4$ crystal, the energy resolution of a ^{137}Cs source resulted in 11.4% at 662 keV, and 6.5% at 1173.2 keV and 8.6% at 1332.5 keV for ^{60}Co. As the sizes of the thickness decreases, a slight deterioration in energy resolution occurred with more Compton scattering in the energy spectrum. A CsI(Tl) crystal was also used for comparison; this crystal was 19mm in thicknesses and length. This crystal had an energy resolution for ^{137}Cs of 12.3% at 662 keV, 5.3% at 1173.2 keV and 6.6% at 1332.5 keV for ^{60}Co. The CsI(Tl) crystal capable of measuring low energies in which x-ray peaks were visible with some sources. The $CdWO_4$ crystal was more beneficial when measuring gamma-ray energy close to 511 keV that is primary signature from geo-neutrino detection with ^{106}Cd. Greater Compton scattering occurred with the CsI crystal when detecting higher energies. Using a number of smaller crystals allows for the development and characterization of these crystals.

Alyssa Day
University of South Dakota

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