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Neutron Detection with Cadmium Tungstate Crystal Scintillators WILLIAM BAKER, Texas A&M University — Neutrons of MeV scale energy can be produced by a number of nuclear reactions, yet traditional detectors have a hard time seeing these free neutrons due to their lack of charge. Their detection has relevance to dark matter experiments and radiation monitoring for security. The most common means of detecting neutrons is through scintillating materials which typically create a signal by converting the energy of the neutron into light. We present a neutron detection system utilizing a high density polyethylene for energy moderation, Gadolinium (Gd) and Cadmium Tungstate ($CdWO_4$), an inorganic crystal scintillator. Gadolinium is used for its high neutron capture cross-section which produces several high energy gammas in a single n + Gd_{157} reaction. $CdWO_4$ converts this gamma production into a burst of light in the ultraviolet range, which can be detected with photo-sensitive electronics such as Avalanche Photo-Diodes (APDs). We produce a monoenergetic collimated beam of neutrons for use in calibration by using a pelletron-driven proton accelerator. Moving forward from preliminary results with a polyvinyltoluene scintillator, we explore the detection efficiency for $\sim$ 120 keV neutrons with $CdWO_4$.

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