Abstract Submitted
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Producing Mono-energetic Neutrons for Research[1] STEVEN JEPEAL, Univ of Notre Dame — Free neutrons are seldom produced in nature and are unstable, decaying back to protons with a mean life of 881s. The only natural sources are spontaneous fission of actinides and cosmic ray interactions, both of which are rare processes. The detection of neutrons indicates unusual nuclear activity, allowing neutron detection the roll of the "smoking gun" for seeking potential nuclear terrorism. Recently, there has been a push for the development of new neutron detectors, ideally sufficiently inexpensive that a detector can be carried by all first responders such as police and fire fighters. One promising new material is the inorganic scintillator CLYC, a crystal of chlorine, lithium, yttrium and cesium. CLYC has a high energy resolution not only for gamma rays, but also for fast neutrons. At the University of Massachusetts, Lowell, CLYC is being developed in collaboration with local industrial companies. To evaluate its response to neutrons, in to 500keV to 4MeV energy range, the CN Van de Graaff generator is used to produce neutrons, via the 7Li(p,n)7Be reaction. However, the important energy regime of 4-10MeV is currently inaccessible. This current project is to build a gas-cell target to enable the D(d,n)3He reaction and produce neutrons of energy up to 9MeV, an approach that has been used successfully at the University of Kentucky. The project involves some mechanical engineering management, then chamber construction, vacuum testing, developing thin window technology, and finally commissioning of the gas cell using accelerated beams. The commissioning will be physics rich in quantifying the flux and energy resolution of the neutron beam produced.

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