

PARTICLES-MATTER INTERACTIONS: Detectors

1. Simulation of a neutron detector prototype

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To detect a neutron, a quite usual method is to moderate it in order to increase its cross section of interaction with a medium sensitive to neutrons, as Boron or Gadolinium. Then, the ion or electron emitted after the neutron scattering is detected with a “classical” detector. The goal of this work is to simulate the trajectories of neutrons in a polyethylene moderator and the interaction of the moderated neutron with Boron or Gadolinium but especially to consider a new type of detector, namely a luminescent multilayer thin film. Indeed, this kind of film is designed for the determination of the kinetic energy of electron and ion beams. The method employed to make this films is to build a multilayer system through the stacking of several transparent phosphor and slowing-down layers at given depths. The kinetic energy analysis is based on the correlation of the emitted light spectra of the scintillator upon radiation bombardment with the penetration range and nature of the radiation beams. The student has thus to make a feasibility study of this new kind of detector.