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Light Yield Measurements of Heavy Photon Search (HPS) Muon Scintillator Hodoscopes MARIANNE SKOLNIK, Muhlenberg College, STEPAN STEPANYAN, Thomas Jefferson National Accelerator Facility — The HPS is an experiment that will search for new heavy vector boson(s) in the mass range of 20 MeV/c^2 to 1000 MeV/c^2. One of the detectors used for this experiment is a muon hodoscope. We are interested in finding the light yield for the scintillator – wavelength-shifting fiber coupling that will be used in this muon hodoscope. The muon hodoscope will have background signals distorting the data. In order to reduce the background, a threshold cut will be made on the signal coming from the photo-detector. Precision of this cut depends on the average number of photoelectrons, N_{pe}. Previous tests have shown that N_{pe} with Wavelength Shifting (WLS) fibers placed through the holes that go lengthwise down the scintillator is $\sim$12/MeV. In this new muon hodoscope the scintillators will have WLS fibers glued inside the holes. The optical epoxy allows more light, changing N_{pe}. To find N_{pe}, two scintillators with fibers will be used, one of which will have glued WLS fibers. Light will be readout out using photo multiplier tubes (PMTs). The system of two scintillator-fiber-PMTs and one trigger PMT with a scintillator are placed in a dark box. First, position of a single photoelectron peaks is found using an LED light, then using the signal from cosmic muons from trigger PMT light yield is measured. Data are analyzed using ROOT macros. Result of this measurement suggests that light yield form glued fibers is higher than from WLS fibers without glue by a factor of $\sim$1.7, which is sufficient for operation of the HPS muon hodoscope.

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