

Hamamatsu MPPC coupled to a CI scintillator via a WLS fiber: Result of a Test Measurement

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We report a possibility of HAMAMATSU MPPC(Multi Pixel Photon Counter) for muography of a volcano. The number of photons arriving at a photo cathode is computed based on the number of pixels that emit signals. A typical pulse height was measured to be 300 μ V for a single photon. In this experiment, we produced a muon counter that consists of a WLS fiber (Wave Length Shifter fiber) embedded in a CI plastic scintillator, which is coupled to an MPPC having 100 pixels at the photo cathode. As a result, a strong temperature dependence on its gain was measured, and its counting rate was found to be strongly fluctuated. Therefore, we normalized the counting rate of muons after passing through rock to that from the sky (FWD/BAK ratio), and confirmed that this method is useful. In general, when there is a temperature dependence on the gain, an electronics to feed it back (i.e. an ADC) has to be incorporated to the front-end electronics. However, this system consumes power significantly. In order to save the power consumption below that of Cockcroft-Walton PMT we had already established, we suggest the FWD/BAK method instead of using ADC. A signal of an MPPC is extremely weak, and it is interfered by surrounding electric noises. This effect causes a rare but unexpected increase in a counting rate. We have to develop a mechanism to suppress this effect. This meeting was supported by the Earthquake Research Institute cooperative research program.