

# Neolith-s scintillator gain check

Y. Satou, S. Malladi, Y. Makimura

June 25, 2025

## Abstract

By a gain check of the Neolith-s converter/catcher scintillators, high voltage values have been determined for the individual PMTs, which realize a height of  $-30$  mV for the observed  $^{60}\text{Co}$  compton edge signals. The results are listed, to be used to estimate the maximum channel of the QDC (or the equivalent).

## 1 Results

Gain check results are listed in Table 1. In the table, physical locations of the PMTs in the Neolith-s setup are also indicated.

## 2 Miscellaneous

The maximum light output for the converter and catcher scintillators was estimated to be around 100 MeVee [1]. In order to bring the highest light output data within the QTC range, the PMT raw signals were first sent to a splitter unit, at which the signal height was reduced by half ( $-15$  mV). Circuit diagram is shown in Fig. 1.

In this way we are going to keep the calibration values in Table 1, while accommodating the highest expected light output within the QTC range. Threshold setting of the QTC needs to be re-examined by taking into account the current change in the anode signal processing scheme.

## References

- [1] [Light output characteristics of Neolith-s scintillators \(Y.Satoui, Y.Makimura, S.Malladi\)](#).

Table 1: HV values of PMTs of converter scintillators, which lead to a pulse height (for the compton edge of  $^{60}\text{Co}$  gamma rays) of  $-30$  mV at the scintillator center.  $D$  refers to the distance of the source from the scintillator edge at which the PMT is located.

Location	Counter No.	PMT-ID	HV (V)	Signal height (mV)		
				$D=0$ cm	$D=22.5$ cm	$D=45$ cm
Front-top-left	1	E101	$-1100$	$-40$	$-30$	$-25$
Front-top-right		E201	$-1360$	$-40$	$-30$	$-25$
Front-middle-left	2	E102	$-1065$	$-40$	$-30$	$-22$
Front-middle-right		E202	$-1385$	$-40$	$-30$	$-26$
Front-down-left	3	E103	$-1280$	$-40$	$-30$	$-22$
Front-down-right		E203	$-1350$	$-38$	$-30$	$-26$
Rear-top-left	4	E104	$-1165$	$-40$	$-30$	$-26$
Rear-top-right		E204	$-1045$	$-40$	$-30$	$-20$
Rear-middle-left	5	E105	$-1500$	$-40$	$-30$	$-26$
Rear-middle-right		E205	$-1465$	$-40$	$-30$	$-26$
Rear-down-left	6	E106	$-1410$	$-40$	$-30$	$-24$
Rear-down-right		E206	$-1275$	$-40$	$-30$	$-24$

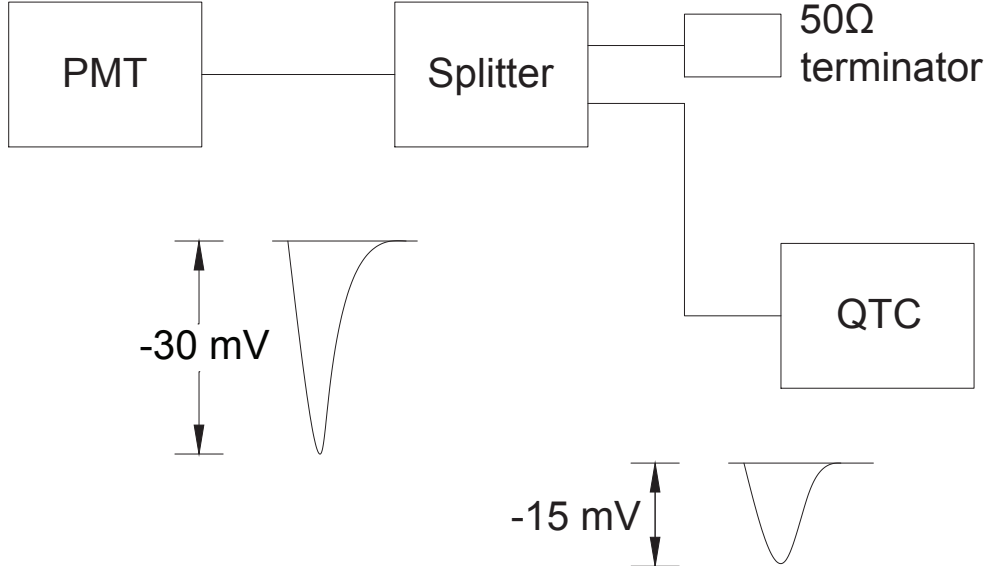


Figure 1: Circuit diagram of the converter and catcher scintillators' anode signals at the earliest stage. Splitter was introduced after the gain calibration, the results of which are shown in Table 1.