

Fabrication of Cables for the Photomultiplier Tubes of the Hall C Neutral Particle Spectrometer

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The photomultiplier tubes (PMTs) of the Hall C Neutral Particle Spectrometer (NPS) are supplied with high voltage via high voltage supply cables and specially made cables, the signal/high voltage cables, which route voltage to the base of the PMT and return the signal from the PMT to a patch panel on top of the NPS frame. This note details the fabrication of these cables.

To power the PMTs of the NPS, high voltage is routed from 30 CAEN A7030TN modules housed in two CAEN SY4527 crates via the high voltage supply cables and the signal/high voltage cables, Fig. 1, [1].

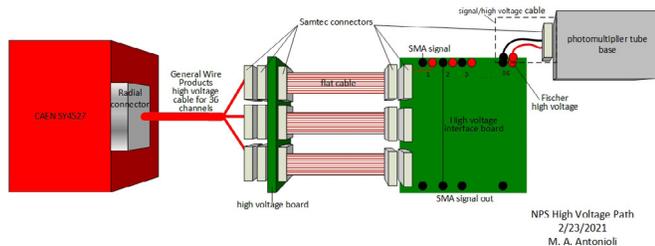


FIG. 1. Schematic of high voltage path from CAEN modules to PMT base.

The signal/high voltage cable comprises two RG-174 coaxial cables of equal length (~28 cm). One cable supplies ~1100 V and is terminated with a Fischer S 102 A018 coaxial connector, the other routes the signal from the PMT base to a patch panel on top of the detector frame and is terminated with a Multicomp Pro SMA coaxial connector. Both cables terminate together at their other end in one Samtec Mini-Mate, five-position, connector, Fig. 2.

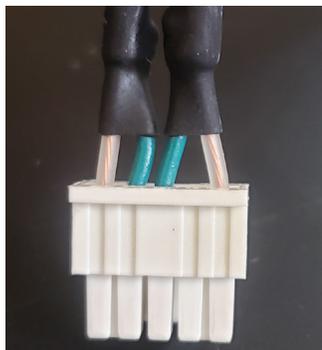


FIG. 2. Samtec connector with voltage and signal cables and two return wires terminated.

The fabrication process is as follows:

the outer jacket of the signal cable is stripped 14 mm; the braid is then trimmed 3.05 mm and the center conductor is trimmed 2.88 mm. The cable is terminated with the Fischer coaxial connector.

the outer jacket of the high voltage cable is stripped 2.5 mm; the braid is then trimmed 5.57 mm and the center con-

ductor is trimmed 3 mm. The cable is terminated with the Multicomp Pro coaxial connector.

to terminate both the signal and the high voltage cables with the Samtec connector, the outer jackets of both cables are stripped 15.4 mm; the braids are trimmed to 10.95 mm and combed. The center conductors of both cables are trimmed 4.45 mm.

to make a drain wire, a 22-mm long jumper wire (green wires shown in Fig. 2) is stripped 5.5 mm on one end and soldered to the braid of the coax cable. The other end of the drain, and the coax cable, is stripped 4.2 mm and crimped to a Samtec pin. One slot (position four) of the Samtec connector is empty. Figure 3 shows each step of the fabrication process and a view of the completed cable is shown in Fig. 4.



FIG. 3. Each step of fabrication process from left to right.



FIG. 4. Completed signal/high voltage cable.

In summation, a total of 1100 signal/high voltage cables were fabricated and tested to confirm that there are no shorts.

[1] [T. Nguyen Trung, Cables Made at JLab, 06/22/2019.](#)