# Pulse Current Monitor Installation Document

## Purpose:

The purpose of the pulse current monitor is to detect small and fast changes in current in the high voltage cable connected to the feedthrough for the MicroBooNE cathode. A similar device was used in ICARUS in an effort to observe the cable “relaxing” as the voltage was raised. Here, we would also like to see any small sparks that our system would otherwise be insensitive to. The device could help us determine a stable operating voltage for data taking.

## Setup:

The setup is largely the same as without the pulse current monitor. We will use the same Dielectric Sciences cable and filter pot as before. We have added the device around the Dielectric Sciences cable as shown in the figure.

The toroid is tightly encased between two pieces of ultra high molecular weight polyethylene secured along the perimeter by screws (well outside of the toroid). The polyethylene is sandwiched between two stainless steel plates with a hole in the middle allowing the cable to pass through. A pipe reducer is welded to each of the plates to gradually reduce the opening to the diameter of the cable. The high voltage center conductor and the cable’s insulate polyethylene layer go through the center of the toroid. The ground connection must go on the outside of the toroid for it to be functional. The ground connection is maintained by the screws through the polyethylene. We have also attached ground braids around the outside of the polyethylene attached through the ends of the screws. The third continuation of the ground is through the copper tape that also connects the two pieces of the holder. The ground is continued to the cable by the upper reducer sliding below the cable’s ground before being secured.

The toroid is a commercial device from Pearson Electronics, model 110. The output signal is sent out on an RG 58 BNC connection. The cable was tested to at least 100 kV at the PAB in air. A similar setup has been used to trigger a test stand at the PAB for over a month.

Dave Huffman has studied the behavior of the toroid and the output matches his Spice model. His study is attached in an additional document.

## Procedure

The Glassman must be off. Remove the toroidless cable from the pot. Put on fall protection. Open the platform. Undo any extra ground connections at the cryostat feedthrough flange. Pull out the cable. Insert the toroid end of the new cable and secure it replacing any grounds. Climb up and put the platform back. Route the cable decently and insert back into the filter pot. Turn the Glassman back on.

## Monitoring

The toroid should be connected to a scope and triggered on. Our slow monitoring group knows how to read out triggered traces. It would be desirable to have this trigger read out the PMT system.