

ABSTRACT

Digitization at the Feed Through: Circuit Design

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A major challenge in modern particle physics experiments is to reduce and control the noise or background signal of the experiment. These unwanted signals could affect the experiment's performance and cause many problems in the future analysis of data. The MicroBooNE detector is a liquid argon time projection chamber for detecting neutrinos. One of the concerns with the MicroBooNE detector is the contamination of analog signals from noise that is introduced either through the process of digitization or by a long cable run to the data acquisition system. A redesign of the feed through electronics can help reduce the contaminating noise by digitizing the signal with a Wilkinson digital converter immediately after the feed through of the detector and by allowing a longer cable run. Many changes have been made to the schematic and layout of the control card that houses the pulse shapers, time-to-digital converters, and Ethernet port. Many options for designs and components have been included on the new board so that they can undergo ample testing before final decisions are made. The eventual goal is to have a design for a control card that implements a low-noise digitization process, can reside immediately after the detector feed through, allows for a longer cable run, and fits in the same dimensions as the previous board.