

ABSTRACT

Digital Photomultiplier Tube Bases and Preparation for the Chicagoland Underground Observatory for Particle Physics' Muon Veto Dark Matter Detector
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The Chicagoland Underground Observatory for Particle Physics (COUPP) is preparing to commission a muon veto weakly interacting massive particle (WIMP) dark matter detector consisting of a 30-liter, 66-kg, heavy-liquid bubble chamber, amidst a one-ton water Cerenkov light cosmic ray detector, by the end of 2009. The water Cerenkov light detector will use 19 Hamamatsu photomultiplier tubes (PMT). New digital bases were designed and created for these PMTs, allowing 20 PMTs to be connected to a controller card, which is in turn connected and controlled by a single computer. Due to the revolutionary design of these bases, before they could be implemented in the detector, they required testing and debugging to ensure their proper operation, which was performed without incident. Following the debugging of the bases, a 55-gallon water Cerenkov light detector utilizing one PMT was set up, and measurements were taken using a scale proxy of the 66-kg bubble chamber to determine to what extent the bubble chamber will affect the light properties of the one-ton Cerenkov light detector, and how much of the bubble chamber would be required to be covered in white Tyvek to ensure good light characteristics.