

Development of a multi-channel power supply for the TAO and DUNE experiments

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Modern photodetectors, such as silicon photomultipliers (SiPM), are widely used in high-energy physics. In particular, for the near detector of the JUNO experiment, it is planned to use ~250,000 SiPMs, which will be grouped into matrices (~4000 pcs). These photodetectors will be used to register the light that is emitted as a result of the interaction of neutrinos and the detector's scintillator. Also, SiPMs is planned to be used in the light readout system in the LAr TPC of the DUNE experiment (~8400 pcs). In each of the above experiments, it is necessary to provide a large number of photodetectors with power supply.

There are two main types of power supplies: unipolar and bipolar. The advantage of a bipolar power supply is its low cost, however, they have a more complex power connection scheme for the photodetector. On the other hand, unipolar power supplies are more expensive, but have less current consumption. To provide power to SiPMs, we chose a unipolar power supply scheme. According to our technical specification, a multi-channel unipolar power supply based on the AD5535B DAC was developed with a fairly low cost (\$10/channel) compared to foreign analogues. The report shows the operation scheme of the power supply, studied its characteristics and developed software for controlling and monitoring the state of the board.

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