

Experimental string with fiber optic data acquisition for Baikal-GVD

Summary

The first stage of the construction of the deep underwater neutrino telescope Baikal-GVD is planned to be completed in 2024. The second stage of the detector deployment is planned to be carried out using the data acquisition system based on fiber optic technologies. This work is devoted to developing and in-situ tests of the optical DAQ for GVD.

GVD optical DAQ implementation is based on the CWDM technology. This approach minimizes the number of underwater optical cables and connectors. The DAQ based on CWDM technology was successfully tested as a part of the telescope's experimental section with 12 optical modules during 2020, and an experimental string with three such sections was installed in Lake Baikal in April 2021. Each section of this string forms three optical channels: *trigger*, *sync*, and *data*. All section information is transmitted to the cluster DAQ center using a CWDM multiplexer over a single optical fiber.

Deep underwater optical cables are a key element of the optical network of the telescope. Most of the optical connections were provided by DWTEK Co, Taiwan. The monitor the optical signal attenuation in the cables shows that the signal power exceeds the threshold of the receivers by more than 10 dB. At the same time, there are fluctuations in the signal power. The study of this problem is currently in progress.

In general, it is possible to make a conclusion about the prospects of implementing a fiber-optic communication system based on CWDM technology in Baikal-GVD. However, the problems associated with providing the installation with reliable deep underwater optical cables have not been completely solved. In 2022, it is planned to continue research in this direction with the additional experimental strings in Lake Baikal.