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Acoustic tomography applied to the Baikal Neutrino Telescope

An acoustic echo-location system was applied for distant localization of the Baikal Neutrino Telescope string positions. The echo-location system was situated on the ice surface, while the telescope stayed in its standard arrangement between 1100 and 1200 m depth. “Large” reflectors, such as the end buoys located above the strings, served as reference marks. Acoustic localization of these marks was conducted by means of antenna comprising four acoustic projectors spaced with 50 meters from each other and placed under the ice on the depth of 9.5 m. Acoustic pulses occupied the frequency band between 10 and 22 kHz and had the length of 51.2 s. In result of tomographying, all three large objects (two double buoys and the central electronics module) were localized and visualized as evident (contrast) spots. Localization accuracy represented the value of app. 0.2 m (range lengthwise) and app. 1.0 m (range crosswise), which was fully acceptable for current purposes. There also have been made estimations for signal forms and parameters necessary for improved acoustic tomography measurements of the telescope.

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