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Measurements of radioactive purity of WLS plates for water Cherenkov detectors

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The next generation water Cherenkov detector Hyper-Kamiokande in its outer part will utilize light-collection modules composed of a PMT surrounded by a plexiglass-based WLS plate. Success of the rich physics program of the experiment that ranges from energetic atmospheric and accelerator and down to cosmic and solar neutrinos involves strict requirements and control of the radiopurity of the elements used in the detector. The talk presents the results of the checks of the specific activity of natural radionuclides in the samples of the WLS plates. The work was carried out in two underground laboratories of the Baksan Neutrino Observatory of INR RAS: the “NIKA-2” facility located at a depth of 660 m water equivalent and the “SNEG” spectrometer in the DUBL-4900 hall at a depth of 4900 m.w.e.. The measurements were performed with the HPGe-based gamma-detectors. The final sensitivity of mBq/kg was achieved. It was demonstrated that the samples of the mass-production WLS plates possess low natural radioactivity that fulfils the requirements set by the Hyper-Kamiokande physics program. The work confirms the effectiveness of the low-background gamma-ray spectrometry technique for the quality control of materials used in large-scale neutrino detectors.

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