

Track reconstruction in the Cherenkov water calorimeter NEVOD

Cherenkov water calorimeter (CWC) NEVOD is the main part of the Experimental complex (EC) NEVOD designed to detect cosmic rays on the Earth's surface. The CWC detection system represents a spatial lattice of the quasi-spherical modules (QSM), located at its nodes. The QSM is able to measure Cherenkov radiation practically in the entire solid angle of 4π . Due to the modernization of the EC NEVOD and the increase of the QSM spatial lattice volume from 800 m^3 to 1200 m^3 , the development of new and adaptation of old reconstruction methods are required.

Track determination in the CWC NEVOD was carried out by the "simple" method, in which the particle direction was reconstructed by summing the amplitudes from the photomultiplier tubes directed along one axis. The analysis shows that for particles passing through the center of the QSM array, the "simple" method gives errors in track reconstructing by angle from 2° to 20° and by distance to the center of gravity of about 1 m.

The maximum likelihood method was used to increase the reconstruction accuracy. The dependence of the photomultiplier response on the distance to the track and on the incidence angle of Cherenkov light to the photocathode was obtained for calculating and analyzing the likelihood function.

In the talk, the results of single particle track reconstruction by the "simple" method are presented. The dependence of the PMT response on the distance to the track and on the incidence angle of Cherenkov light to the photocathode is obtained. The features of the likelihood function, taking into account the obtained dependence, is discussed.

Primary author: BUSEL, Darya (MEPhI)

Co-authors: Dr DMITRIEVA, Anna (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); Ms KARETNIKOVA, Tatyana (National Research Nuclear University "MEPhI"); KHOKHLOV, Semyon (National Research Nuclear University MEPhI); SHUTENKO, Victor (National Research Nuclear University MEPhI)

Presenter: BUSEL, Darya (MEPhI)

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