

Investigating the possibility of separating multi-muon events in the KM3NeT experiment

Giorgi Bukhnikashvili

email:

giorgi.bukhnikashvili707@ens.tsu.edu.ge

Ivane Javakhishvili Tbilisi State University, Faculty of
Exact and Natural Sciences
0128, I. Chavchavadze Avenue 1,
Tbilisi, Georgia

The aim of the bachelor's thesis is to study the possibility of distinguishing multi-muon events in the KM3NeT experiment. KM3NeT is a European research infrastructure that plans to deploy two large-scale neutrino telescopes on the floor of the Mediterranean Sea: ARCA (Astroparticle Research with Cosmics in the Abyss) and ORCA (Oscillation Research with Cosmics in the Abyss). Both detectors register and measure Cherenkov light, which is produced when a charged particle travels through water at a speed greater than the speed of light in water.

Currently, the methodology used in the experiment does not have the means to distinguish single-muon events detected by the detector from multi-muon events. As such, one of the current challenges in KM3NeT is the separation/identification of multi-muon events.

In this thesis, work was carried out on simulated data from ARCA21, in which multi-muon events made up more than 60% of the total number of events. In data processing, computational algorithms were used that allowed the visualization of multi-muon events. With the algorithm developed in this thesis, it is possible to reconstruct multi-muon events in the KM3NeT experiment.