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Measured and simulated muon flux for the first KM3NeT Detection Units

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The KM3NeT Collaboration has successfully deployed its first detection units in the Mediterranean Sea in 2016 (ARCA) and 2017 (ORCA). The sample of data collected between December 2016 and December 2017 has been used to measure the atmospheric muon flux at two different depths under the sea level: 3.5 km with ARCA and 2.5 km with ORCA. The atmospheric muon flux represents an abundant signal for a neutrino telescope and can be used to test the reliability of the Monte Carlo simulation chain. In this case, the measurements are compared to Monte Carlo simulations based on MUPAGE and CORSIKA codes. MUPAGE is fast, parametric simulation code developed for the ANTARES experiment that generates muon events, induced by cosmic rays impinging the Earth atmosphere, at different undersea depths. The atmospheric muon distributions at the sea level obtained with MUPAGE/CORSIKA are propagated to the detector with the MUSIC code, a 3D program that takes into account all muon energy loss processes. Finally, all muons arriving at the detector are transported through the active volume, Cherenkov light is generated and the same triggering algorithms used during data taking are applied. The main features of the simulation and reconstruction chain are discussed and presented.

Summary

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