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Combined search for cosmic neutrino sources with ANTARES and KM3NeT/ARCA

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The search for cosmic neutrino sources is a major objective of high-energy astrophysics. The ANTARES neutrino telescope, operational from 2007 to 2022 in the Mediterranean Sea, provided valuable data over 16 years, achieving an angular resolution better than 0.4° at the highest energies and offering a privileged view of the Southern sky. Following its legacy, the KM3NeT/ARCA detector is currently under construction near the coast of Southern Italy. Upon completion, ARCA will instrument a volume of about one cubic kilometer and achieve an angular resolution below 0.1° for muon neutrinos above 300 TeV. Currently, more than 10% of the detector is installed and collecting data.

This work presents a combined analysis based on the full ANTARES dataset and KM3NeT/ARCA data recorded between May 2021 and September 2023, with an evolving detector geometry up to 21 detection lines. Searches for neutrino emissions from both point-like and extended sources are performed, using a comprehensive catalogue of gamma-ray emitters, including Galactic sources (from TeVCat), extragalactic AGNs detected by VLBI, and candidates previously highlighted by IceCube.

The combination of ANTARES and ARCA data improves the sensitivity over a wide energy range, from few TeVs to several PeVs, with a particular advantage in the Southern sky. The results of this analysis contribute to ongoing efforts to identify the origin of cosmic neutrinos within the framework of multi-messenger astrophysics.

Collaboration you are representing

KM3NeT, ANTARES

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