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Status and prospects of the Antares and KM3NeT experiments

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The ANTARES detector is the first undersea neutrino telescope. It has been taking data continuously since 2007, with the main goal of searching for astrophysical neutrinos in the TeV-PeV range.

The optical properties of the sea water, in particular the long scattering length, allow for a very good resolution in the reconstruction of the interaction vertex for neutrinos of all flavours and in the identification of neutrino direction. Its location in the Northern hemisphere guarantees an excellent point of view for the identification of neutrino sources located in the Southern Sky, with a special attention to the Galactic Plane and Centre.

The observations performed with ANTARES have allowed to put constraints on the origin of the cosmic neutrino flux discovered by the IceCube detector. Moreover, the ANTARES Collaboration is actively involved into a manifold multi-messenger program. In this contribution, the latest experimental results on the searches for neutrinos correlated with the recently discovered gravitational wave signals and FRB events will be discussed. Also the results on indirect searches for dark matter from massive objects like the Sun and the Galactic Center will be presented.

The high quality of the data collected with the ANTARES telescope and the competitiveness of the results have proven the tremendous potential of the sea water Cherenkov technique, paving the way to the new, larger telescope, KM3NeT.

KM3NeT is a research infrastructure hosting neutrino telescopes in the Mediterranean Sea. Two detectors using the same detection technology but different granularity are foreseen: ARCA, with an instrumented volume of a km³, at a depth of 3500 m offshore Capo Passero, Italy, designed to discover and observe high-energy neutrinos (TeV ÷ PeV) of cosmic origin, increasing the potential of the ANTARES telescope in the identification of neutrino sources; and ORCA, with an instrumented volume of a few Mton, at a depth of 2500 m offshore Toulon, France, optimized to measure atmospheric neutrinos with energies at the GeV scale, with the goal to study of the neutrinos mass hierarchy.

The KM3NeT Collaboration has started the construction of both detectors. The first detection units were deployed and analyses are ongoing to validate the detector performances. The status of the ARCA and ORCA detectors and the future prospects of the project will be presented.

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