

COLLOQUI di FISICA

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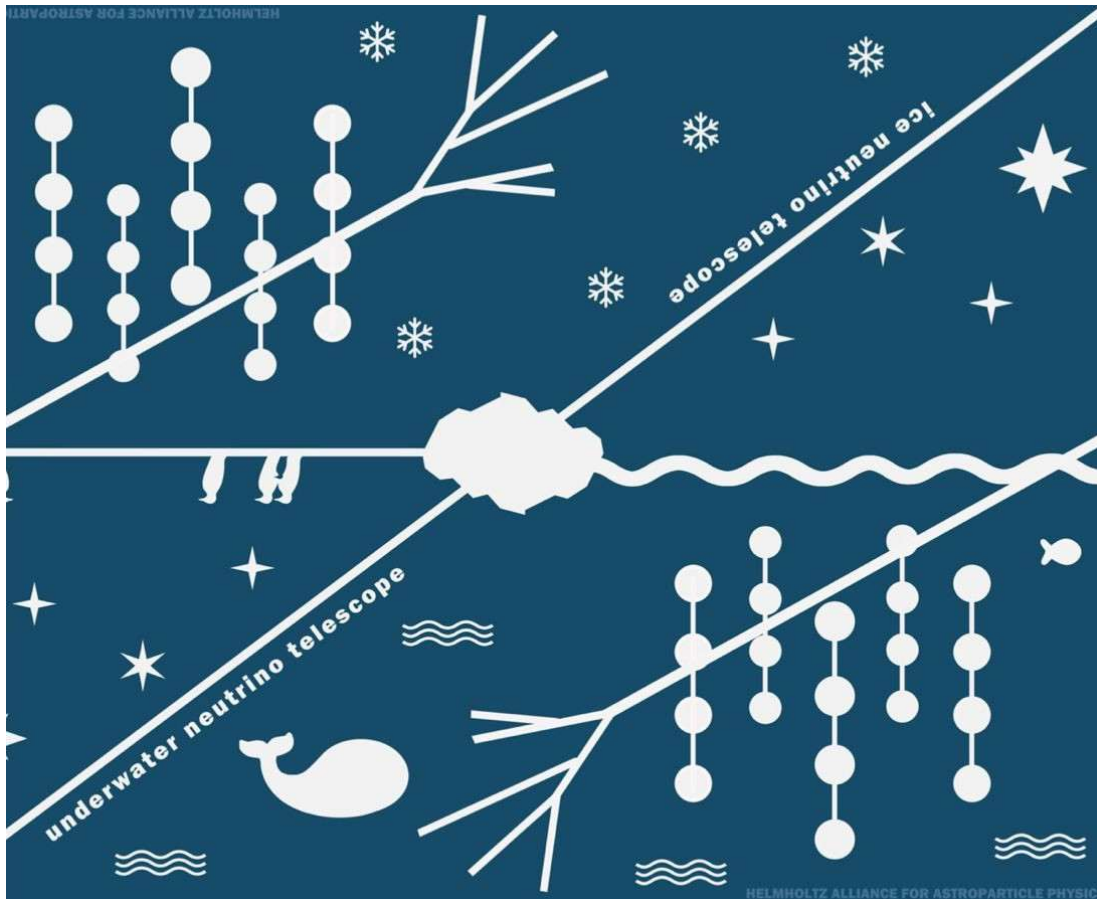
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High energy neutrino telescopes under ice and under water challenges and new findings

Neutrino astronomy has acquired an increasingly important role in investigating violent phenomena in remote regions of the universe, completing the multi-messenger scenario together with electromagnetic radiation, cosmic rays and gravitational waves.

The flux of astrophysical neutrinos, in the energy region of greatest interest, i.e. above 100 TeV, is rather small and it drives the construction of cubic-kilometre scale detectors which must operate for decades. This is the target for the second generation of underwater and under-ice Cherenkov neutrino telescopes, namely IceCube, KM3NeT and GVD-Baikal. IceCube has already reached an instrumented volume of about 1 km³, while KM3NeT and GVD-Baikal will reach the target in the coming years. This contribution will review the scope and the main characteristics of such detectors,



discussing their similarities and differences in terms of construction and performance. A review of the main recent scientific findings will also be given, with emphasis to the ultra high energetic neutrino discovered by KM3NeT and published in Nature last February 12th 2025. Finally, the role of these experiments in the context of Global Neutrino Network will be discussed, along with new projects that are still in the design phase or are testing the first detector prototypes.