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Acoustic Neutrino Detection In a Adriatic Multidisciplinary Observatory (ANDIAMO)

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The existence of cosmic accelerators able to emit charged particles up to ZeV energies has been confirmed by the observations made in the last years by experiments such as Auger and Telescope Array. The interaction of such energetic cosmic-rays with gas or low energy photons, surrounding the astrophysical sources or present in the intergalactic medium, guarantee an ultra-high-energy neutrino related emission. When these energetic neutrinos interact in a medium produce a thermo-acoustic process where the energy of generated particle cascades can be conveyed in a pressure pulse propagating into the same medium. The kilometric attenuation length as well as the well-defined shape of the expected pulse suggest a large-area-undersea-array of acoustic sensors as an ideal observatory. For this scope, we propose to exploit the existing and no more operative offshore (oil rigs) powered platforms in the Adriatic sea as the main infrastructure to build an acoustic submarine array of dedicated hydrophones covering a surface area up to 10000 km^2 and a volume up to 500 km^3. In this work we describe the advantages of this detector concept using a ray tracing technique as well as the scientific goals linked to the challenging purpose of observing for the first time ultra-high-energy cosmic neutrinos. This observatory will be complementary to the dedicated radio array detectors with the advantages of avoiding any possible thermo-acoustic noise from the atmospheric muons.

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