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Performance and optimization of the KM3NeT high-energy neutrino telescope

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The observation of extraterrestrial high-energy neutrinos will provide unique piece of information on the most violent and highest energy processes in our Galaxy and far beyond. Indeed, their measurement will allow for new insights into the acceleration mechanisms and their localization in galactic and extragalactic sources, clarifying the role of the hadronic component. KM3NeT is an international consortium with the aim to build a research infrastructure in the Mediterranean Sea hosting an underwater multi-km3 high-energy neutrino telescope. KM3NeT was funded by European Union with a Design Study (2006-2009) and a Preparatory Phase (2009-2012). The Km3NeT Design Study was concluded with the publication of the Technical Design Report (TDR) that outlines the main technologies. The final design, based on detection units made of flexible towers equipped with multi-photomultipliers, is defined in the Preparatory Phase. The simulation of detector response to astrophysical neutrino fluxes, with particular emphasis on point-like sources, represents an essential tool. Detector performance is presented in terms of sensitivity (flux that can be excluded at 90% CL) and discovery potential (flux that can be detected a 5 σ above the background noise). Optimization results and detector response to point like sources will be shown.

Presenter: TROVATO, Agata (LNS)

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