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Deep Learning in KM3NeT

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The KM3NeT research infrastructure will comprise two large underwater Cherenkov neutrino telescopes in the Mediterranean sea. The ARCA detector will be located 100 km off-shore Capo Passero (Italy); its main science objective is the detection of high energy cosmic neutrinos. The ORCA detector will be located 40 km off-shore Toulon (France); its goal is the determination of the neutrino mass hierarchy. Deep convolutional neural networks are being used to reconstruct the event properties, including direction and energy of the incident particle, vertex position and event topology –a proxy for the flavor of the interacting neutrino. Background/signal separation and uncertainty estimation are provided as well. The main purpose of this contribution is to show the results achieved by deep convolutional neural networks and to compare their outputs with conventional reconstruction algorithms. The comparison shows that these first deep learning models already yield results and performance competitive with the official reconstruction pipeline.

Presenter: STELLACCI, Simona Maria (INFN)

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