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Simulation Tools for the MURAVES Experiment

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The MUon Radiography of Mt. VESuvius (MURAVES) project aims to probe the internal structure of the summit of Mt. Vesuvius. The setup of the MURAVES detector consists of three identical and independent tracking hodoscopes, made of scintillator bars coupled to SiPM. The analyses often rely on simulation based predictions, in our case for a better comparison between the data and different density hypotheses, and for the optimization of the reconstruction algorithms, as well as to estimate backgrounds.

The workflow of the simulation chain of the MURAVES experiment is introduced. For the generation of cosmic ray showers, a systematic comparison of particle generators, including CORSIKA, CRY and EcoMug, has been conducted. Study of the muon propagation through the rock is performed. The expected transmitted muon flux through Mt. Vesuvius is simulated with the Backward Monte Carlo muon transport library PUMAS and the parametric Monte Carlo simulator MUSIC. The simulation of the response of the detectors is developed using Geant4. In order to compare with the real data, the raw hits in Geant4 are converted into clusters through a simulated digitization process, followed by dedicated clustering algorithms and thresholds as well as the tracking methods as performed in real data analysis. First results of a simulation vs. data comparison will be presented.

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