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Atmospheric MUons from PArametric formulas: a fast GEnerator for neutrino telescopes (MUPAGE)

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Atmospheric muons play an important role in underwater/ice neutrino detectors, because they provide the most abundant source of events for calibration and test. On the other side, they represent the major background source. A fast Monte Carlo generator (called MUPAGE) of bundles of atmospheric muons for underwater/ice neutrino telescopes is presented. It produces the event kinematics on the surface of a user-defined virtual cylinder, surrounding the detector. MUPAGE is based on parametric formulas obtained from a full Monte Carlo simulation of cosmic ray showers generating muons in bundle, which are propagated down to 5 km w.e. The multiplicity of the muons in the bundle, the muon spatial distribution and energy spectrum are simulated according to a specific model of primary cosmic ray flux, with constraints from measurements of the muon flux with underground experiments. As an example of the application, the result of the generation of events on a cylindrical surface of 3 km^2 at a depth of 2450 m of water is presented.

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