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Montecarlo simulation of dose contribution from environmental sources to a biological system in the RENOIR Radiobiology Experiment at INFN-LNGS

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The RENOIR radiobiology experiment focuses on the study of the underlying biophysical mechanisms that trigger the different biological response observed in external laboratory with respect to the underground LNGS laboratory, where the cosmic ray flux is reduced by a factor of 10^6 and the neutrons flux by a factor of 10^3 . A detailed characterization of the radiation spectrum is crucial for this kind of study, as well as an investigation on whether all the components of the natural radiation field weigh in the same or in different way to trigger the biological responses.

We apply Montecarlo simulations to the estimate of the dose contribution from different environmental sources (muons, photons, and neutrons) to the biological system under study in the RENOIR project. We use as input particle flux measurements performed above ground and a detailed description of the geometry and of the materials of the experimental setup, to calculate the impact on the dose rate from each particle source. The results will be used to build a careful modeling of the experimental conditions for the RENOIR radiobiology experiment, that will help the interpretation of the biological results.

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