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Modelling the Muon Flux in the Huguenot Tunnel

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The Southern hemisphere offers a wonderful opportunity for scientists to explore unique initiatives offered by a low-level radiation facility. Establishing a deep underground physics laboratory to study, amongst others, double beta decay, geo-neutrinos, reactor neutrinos and dark matter has been discussed for more than a decade within the austral African physicists' community. The Paarl-African Underground Laboratory (PAUL) is foreseen as an open international laboratory, a unique opportunity for Africa, devoted to the development of competitive science in the region. It has the advantage that the location, the Huguenot tunnel, exists already and the geology and the environment of the site is appropriate for an experimental facility. A report of the most recent developments in the modelling of muon flux and muon measurements which are required for the establishment of the PAUL and the envisaged research programs is presented.
Background radiation levels due to cosmic rays have always been a thorn in the side of low‐level radiation facilities. To counteract this background radiation, these facilities have moved underground into a tunnel or mine so that the overburden will act as a shield to attenuate and stop the high energy cosmic rays. In this instance there will be looked into developing an underground physics facility called PAUL (Paarl Africa Underground Lab) in the Huguenot Tunnel connecting Paarl and Worcester in South Africa. This paper will address the attenuation and propagation of cosmic ray muons through the mountain to get an idea as to how the background muon noise this facility must take into account. To achieve this a Monte Carlo Code, GEANT4 will be used to simulate the scenario. The results found in this paper were in reasonable agreement with those in literature and previous studies done on the topic.

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