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Cosmic muon background estimate for shallow underground detectors

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Abstract content

One of the severe limitations in detecting neutrino signals from nuclear reactors is that the copious cosmic ray background imposes the use of a time veto upon the passage of the muons to reduce the number of fake signals due to muon-induced spallation neutrons. For this reason neutrino detectors are usually located underground, with a large overburden. However there are practical limitations that do restrain from locating the detectors at large depths underground.
In order to decide the depth underground at which the Neutrino Angra Detector (currently in preparation) should be installed, an estimate of the cosmogenic background in the detector as a function of the depth is required.
We report here a simple analytical estimation of the muon rates in the detector volume for different plausible depths, assuming a simple plain overburden geometry.
We extend the calculation to the case of the San Onofre neutrino detector and to the case of the Double Chooz neutrino detector, where other estimates or measurements have been performed. Our estimated rates are consistent.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 4 (HE part 1), pages 831-834

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