CORRELATION OF <= 10 TEV PRIMARY GAMMA RAY DIRECTION AND THE DIRECTI

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For experiments sensitive to secondary muons at ground level, it is of interest to calculate the correlation between the muon's angle and the angle of the associated gamma ray primary. A detailed Monte Carlo is needed for this calculation as both hadronic as well as electromagnetic processes must be carefully modeled. Discrete primary gamma ray energies from 1 GeV to 10 TeV are calculated with the Monte Carlo code FLUKA which calculates these processes with good precision in this energy region.
The angular correlation between the muon's direction and that of the primary gamma ray is calculated as well as the effect of the Earth's magnetic field, and the effect of temperature and pressure variations in the Earth's atmosphere. For example: an atmospheric pressure increase of 3% causes a decrease in muon rate of 4% at 10 GeV (3% at 1 TeV); a temperature increase of 5% causes a decrease in muon rate of 6.0% at 10 GeV (4% at 1 TeV). It is found that, although the muons from gamma ray primaries are lower in number than those from hadronic primaries, they still can be used to investigate point sources of gamma rays in an interesting energy region. The angular correlation is quoted in terms of the width of the muon's angular distributions relative to the angle of the incident gamma ray primary. These values are then folded with gamma ray primary spectra parameterized by various spectral indices. Angular resolutions of ~1 degree are obtained with some dependence on the assumed spectral index.