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The impact of clouds on image parameters in IACT at very high energies

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The effective observation time with the Cherenkov telescopes arrays is limited to clear sky conditions due to considerable absorption of Cherenkov light by the possible presence of clouds. However below the cloud altitude the primary particles with high energies can still produce enough Cherenkov photons to allow detection by the large telescopes. In this paper, using the standard CORSIKA code, we investigate the changes of shower image parameters due to cloud absorption for gamma-ray and proton showers with various energies - from 2 TeV to 100 TeV and from 10 TeV to 200 TeV, respectively. We consider the clouds with different transmissions located at various altitudes above the ground level (between 8 km and 3 km). We show that, for both simulated primary particles at fixed energy, in the presence of clouds the WIDTH and the DIST distributions are shifted towards larger values. This shift decreases with the cloud altitude. The LENGTH distributions are shifted towards smaller values for the primary gamma-ray, while for primary proton this shift is not expected. We conclude that large Cherenkov telescopes with large camera FOV might be used for observation of energetic gamma-ray shower.

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