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Measurement of the muon charge ratio in cosmic ray events with the CMS experiment at the LHC

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We present a measurement of the ratio of positive to negative muon fluxes from cosmic ray interactions in the atmosphere, using data collected by the CMS detector both at ground level and in the underground experimental cavern at the CERN LHC. Muons were detected in the momentum range from 5 GeV/c to 1 TeV/c. The surface flux ratio is measured to be 1.2766 ± 0.0032 (stat.) ± 0.0032 (syst.), independent of the muon momentum, below 100 GeV/c. This is the most precise measurement to date. At higher momenta the data are consistent with an increase of the charge ratio, in agreement with cosmic ray shower models and compatible with previous measurements by deep-underground experiments.

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