

# Measurement of the cosmic ray energy spectrum and composition with IceCube

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The IceCube Neutrino Observatory at the geographic South Pole includes the cubic-kilometer deep-ice detector as well as a square-kilometer particle detector at the surface, IceTop. This unique combination allows measuring multiple components of cosmic-ray induced air showers in the PeV to EeV energy range: IceTop samples the electromagnetic component at the ground level and allows studying GeV muons in the periphery of the air shower; the deep-ice detector is sensitive to TeV muons in the shower core and in addition has collected a high-statistics sample of atmospheric muons from cosmic rays in the tens to hundreds TeV energy range. I will discuss the cosmic ray energy spectrum and mass composition measured with three years of IceCube data. Further, I will present a measurement of the muon LDF in IceTop, which gives an additional and complementary handle on cosmic-ray composition.

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