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## Determination of the invisible energy of extensive air showers from the data collected at Pierre Auger Observatory

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In order to get the primary energy of cosmic rays from their extensive air showers using the fluorescence detection technique, the invisible energy should be added to the measured calorimetric energy. The invisible energy is the energy carried away by particles that do not deposit all their energy in the atmosphere.

It has traditionally been calculated using Monte Carlo simulations that are dependent on the assumed primary particle mass and on model predictions for neutrino and muon production.

In this work the invisible energy is obtained directly from events detected by the Pierre Auger Observatory. The method applied is based on the correlation of the measurements of the muon number at the ground with the invisible energy of the showers. By using it, the systematic uncertainties related to the unknown mass composition and to the high energy hadronic interaction models are significantly reduced, improving in this way the estimation of the energy scale of the Observatory.

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