Mass composition studies using the surface detector of the Pierre Auger Observatory

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One of the most important ingredients to understand the origin and nature of ultra-high energy cosmic rays is their mass composition. The Pierre Auger Observatory is a hybrid instrument and hence, the most powerful method towards the determination of the primary mass will be a combined analysis of all mass-sensitive observables. The Surface Detector of the Auger Observatory alone allows the study of several parameters with high discriminating power to separate primary species. Novel analysis using the signal rise-time in the Cherenkov stations, the azimuthal signal asymmetry and the number of muons obtained from the signals are discussed.