

Cosmic-ray mass composition with the TA SD 12-year data

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Telescope Array (TA) is the largest ultra-high-energy cosmic-ray (UHECR) observatory in the Northern Hemisphere. It is dedicated to detect extensive air showers (EAS) in hybrid mode, both by measuring the shower's longitudinal profile with fluorescence telescopes and their particle footprint on the ground from the surface detector (SD) array. While fluorescence telescopes can measure the most composition-sensitive characteristic of EAS, the depth of the shower maximum (X_{\max}), they also have the drawback of small duty cycle. This work aims to study the UHECR composition based solely on the surface detector data. For this task, a set of composition-sensitive observables obtained from the SD data is used in a machine-learning method – the Boosted Decision Tree. We will present the results of the UHECR mass composition based on the 12-year data from the TA SD using this technique, and we will discuss of the possible systematics imposed by the hadronic interaction models.

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