

Abstract Submitted  
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**Determining the Mass Composition of Cosmic Rays Using Shower Universality** ANDREA BISCOVEANU, MIGUEL MOSTAFA, Pennsylvania State Univ — The mass composition of ultra-high energy cosmic rays is an important parameter for understanding their origin. Using both fluorescence and surface detectors, The Pierre Auger Observatory measures the depth of shower maximum,  $X_{\max}$ , from which the mass of the primary particle can be inferred. The surface detector measurement of  $X_{\max}$  is based on the principle of shower universality, and increases the number of cosmic rays by at least a factor of 10 with respect to the fluorescence detector measurement since it is not limited by the duty cycle of the fluorescence telescopes. We present an event-by-event comparison of the  $X_{\max}$  measurements from both types of detectors for energies above  $10^{18.8}$  eV, and a preliminary anisotropy study discriminating by the mass of the primary particle calculated using universality.

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