

Abstract Submitted  
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**The Development of Hybrid Analyses at Telescope Array** ELLIOTT BARCIKOWSKI, MONICA ALLEN, University of Utah, TELESCOPE ARRAY COLLABORATION — Telescope Array is the largest cosmic ray observatory in the Northern Hemisphere and is sensitive to Ultra High Energy Cosmic Rays (UHECR) with energies above  $10^{18}$  eV. The flux of UHECR is too low to detect the cosmic rays directly, so UHECR observatories must rely on the extensive air shower (EAS) produced as a cosmic ray interacts in the atmosphere. Traditionally, UHECR have been detected either by using an array of Surface Detectors (SD) spread over hundreds of kilometers or by detecting photons from nitrogen fluorescence emitted as the EAS develops in the atmosphere (FD). Hybrid reconstruction incorporates both FD and SD data, giving good geometrical resolution as well as measuring the longitudinal development of the EAS produced as the primary cosmic ray propagates through the atmosphere. Hybrid reconstruction methods are presented, and development of hybrid Monte Carlo techniques are discussed. We will show that in hybrid mode the resolution of reconstructed pointing directions, the depth of shower maximum and energy are sufficient for composition studies and will allow for the calculation of a cosmic ray energy spectrum with much improved reconstruction systematics when compared to analyses using only SD or FD independently.

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