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Using CORSIKA to quantify Telescope Array surface detector response

Historically, studies of surface detector response have been severely limited by the inability to simulate charge density fluctuations at the distance scale of individual detector units. We present a two-prong solution. First, we have developed a technique that allows us to run the unmodified CORSIKA in parallel mode. This has allowed us to simulate ~ 100 non-thinned CORSIKA showers in the 10^{19} -eV epoch. Second, we have developed a dethinning algorithm that enables us to reconstruct the information lost using the CORSIKA thinning option. This algorithm is validated by comparison with the unthinned parallel showers mentioned above. By convolving a 10^4 event shower library of dethinned CORSIKA events with the Telescope Array surface detector response, we will characterize our surface detector observational capabilities and present extensive Data/Monte Carlo comparisons.

Primary author: Dr STOKES, Benjamin (University of Utah)

Co-authors: Mr IVANOV, Dmitri (Rutgers University and University of Utah); Prof. THOMSON, Gordon (University of Utah)

Presenter: Dr STOKES, Benjamin (University of Utah)