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The Exponentially Modified Gaussian Function As A Tool For Deconvolution Of Astroparticle Physics Data

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The Pierre Auger Observatory has recorded more than two million events of ultra-high energy cosmic rays. In seeking to interpret the data recorded for the events, it is necessary to simulate the interaction of primary cosmic rays with the atmosphere. One of the softwares that is available for this kind of simulation is CONEX. In this study, CONEX is used to simulate various compositions of primary cosmic rays, whose interactions with the atmosphere result in air showers, with a distribution of depths of shower maximum (X_{max}), which is treated as the true distribution. Smearing this distribution with a known σ gives the “measured” distribution. By using the Exponentially Modified Gaussian (EMG) function, we have obtained deconvoluted distribution which is generally in good agreement with the original distribution.

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