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The Atmosphere-Dependent Calculation of Air Fluorescence and its Implementation in the Reconstruction of Air Showers

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The fluorescence yield – the number of photons produced per unit of deposited energy by nitrogen fluorescence as air shower particles move through air – is a crucial ingredient in the reconstruction of air shower parameters using the fluorescence technique. Several values of the absolute fluorescence yield, as well as the parameters which determine its dependence on atmospheric conditions (such as humidity and temperature) will be discussed. We also present a general algorithm for the evaluation of the fluorescence yield, and its implementation in the Pierre Auger Observatory offline reconstruction software. This algorithm can be used to estimate the dependence of reconstructed shower parameters on the yield. We will illustrate the effect of atmospheric conditions on the reconstruction of showers with several examples.

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