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Nitrogen fluorescence in air for observing extensive air showers

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Extensive air showers initiate the fluorescence emissions from nitrogen molecules in air. The UV-light is emitted isotropically and can be used for observing the longitudinal development of extensive air showers in the atmosphere over many kilometers. This measurement technique is well established since it has been used since many decades by several cosmic ray experiments. However, a fundamental aspect of the air shower analyses is the description of the fluorescence emission in dependence on varying atmospheric conditions. Different fluorescence yields affect directly the energy scaling of air shower reconstruction. Furthermore, while applying the fluorescence technique to air shower observations, the position of the shower maximum, a strong indicator for the type of the primary particle of the air shower, can be measured directly.

Within this contribution, the effects of the atmosphere-dependent fluorescence description and the level of accuracy of the underlying atmospheric data are discussed and demonstrated by showing full air shower reconstructions.

Auteur principal: Dr KEILHAUER, Bianca (Karlsruhe Institute of Technology)

Orateur: Dr KEILHAUER, Bianca (Karlsruhe Institute of Technology)

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