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Studying effects of Lorentz violation in the photon sector using extensive air shower simulations

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The effects of isotropic, non-birefringent Lorentz violation in the photon sector can be studied with air showers induced by ultra-high-energy cosmic rays.

Using the 1-dimensional air shower simulation program CONEX, bounds on the studied Lorentz violation were set based on the significant reduction of the average atmospheric depth of the shower maximum $\langle X_{\max} \rangle$ and its shower-to-shower fluctuations $\sigma(X_{\max})$.

In order to improve the search for the Lorentz violation, these modifications, which achieve Lorentz violation, have been implemented in the 3-dimensional air shower simulation program CORSIKA. This allows the inclusion of observables unavailable to a 1-dimensional simulation such as those connected to the lateral particle distribution.

Preliminary results from the 3-dimensional shower simulations will be presented.

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