Photon decay in UHE air showers: stringent bound on Lorentz violation

Fabian Duenkel, Marcus Niechciol, Markus Risse

Department Physik, Universität Siegen, 57068 Siegen, Germany

What is this contribution about?

With isotropic, nonbirefringent Lorentz violation (LV) in the photon sector the decay of UHE photons is possible, leading to significant changes of the shower development, which can be used to place a stringent bound on LV.

Why is it relevant / interesting?

Using UHE air showers, LV can be tested for energies which are otherwise inaccessible.

What have we done?

We extended the approach setting the previously strictest bounds using $\langle X_{\mathrm{max}} \rangle$ by including a second parameter $\sigma(X_{\mathrm{max}})$ in this analysis.

What is the result?

The new bound on LV of $\kappa > -6 \times 10^{-21}$ presented in this contribution improves the previous bound by a factor of 50.

Online ICRC 2021, Berlin, 12-23 July 2021