

Recent results on LIV studies using MAGIC telescopes from the observation of GRB 190114C

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What is this contribution about?

This contribution focuses on the latest results obtained by the MAGIC collaboration on Lorentz-Invariance Violation (LIV) studies from the observation of gamma rays from GRB 190114C.

Why is it interesting?

Can LIV arise from Quantum Gravity (QG) making photons travel faster or slower than the speed of light? Yes it can, according to some QG models. But only at the Planck energy, which is bigger by 15 orders of magnitude than the energy we can currently reach in our experiments. Nevertheless, if you have an “amplifier”, such as the huge cosmological distances that separate astrophysical sources from us, LIV effects can be detectable. In this contribution we show how from the most energetic photons ever detected from a Gamma-Ray Burst (GRB) we were able to put stringent limits on the QG energy scale.

This is the first and only LIV study made so far on GRB observations with IACTs!

What have we done?

For the first time, we search for LIV effects in a GRB observed at TeV energies. By making a set of conservative assumptions about the intrinsic properties of this GRB we analyzed how LIV effects would have deformed the distribution of the observed gamma rays. By comparing these deformed distributions with the observed one, we were then able to detect or exclude LIV effects in this unique observation.

What is the result?

Our results are compatible with the null hypothesis of no time delay induced by LIV and we set lower limits on QG energy scale.

The results are among the most constraining lower limits on the QG energy scale!