

LIVelihood: Testing Lorentz Invariance Violation on Observations of Energy-dependent Time Delays from Multiple-type Gamma-ray Sources

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Some Quantum Gravity (QG) models allow Lorentz Invariance Violation (LIV) to emerge at the order of the Planck energy ($\sim 10^{19}$ GeV). A possible consequence of LIV is the energy-dependent speed of light. This hypothesis can be tested using high energy gamma-ray observations of highly variable and distant sources, by measuring time lag of high energetic events. Imaging Atmospheric Cherenkov Telescopes detect Gamma-Ray Bursts (GRB), flaring Active Galactic Nuclei (AGN) and pulsars up to tens of TeV, which opens an interesting window to explore time lag at high energy. The three major IACTs experiments, H.E.S.S., MAGIC and VERITAS have formed a working group to combine all the relevant data collected in order to constrain the energy scale of LIV. In our contribution, we will present the first results of this working group and the code that was created to handle data from various observatories called LIVelihood. The LIVelihood code uses a likelihood method to analyse these different datasets and is made to perform combination of data from different observatories taking into account their respective Instrumental Response Function (IRF) and systematical uncertainties. The main features and the first results of this code will be exhibit on the combination of data from various gamma-ray observatories. The future steps for the LIVelihood code development and the combination of gamma-ray observatories will be announced.

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