Type: Oral

## Lorentz Invariance Violation searches:\\combined likelihood study on data by H.E.S.S., MAGIC and VERITAS

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Some Quantum Gravity (QG) models developed to unify general relativity and quantum mechanics predict an energy-dependent speed of light in vacuum which breaks Lorentz Symmetry. Such effects are expected to contribute at a characteristic energy scale E\_QG of the order of the Planck Energy. These models are tested by monitoring energy-dependent time-lags for photons emitted by distant, highly energetic and highly variable astrophysical sources - flaring Active Galactic Nuclei, Gamma-Ray Bursts and Pulsars - observed with Imaging Atmospheric Cherenkov Telescopes (IACT) or satellites. However, such studies are restricted by a limited pool of observational data sets. Three major IACT collaborations - H.E.S.S., MAGIC and VERITAS - address such a complication with an inter-experiment working group providing a joint analysis method combining for the first time all three types of available sources, enabling an improved sensitivity to energy-dependent time-lags and a sensitive search for Lorentz Invariance Violation (LIV) redshift dependencies.

This presentation reviews the new standard combination method, based on a maximum likelihood analysis, and assesses its performances using simulations of published source observations from H.E.S.S., MAGIC and VERITAS. It also presents the strategies used to deal with data from different sources and instruments as well as statistical and systematic uncertainties treatment. This new analysis will lead to new limits on E\_QG together with results on redshift dependancies of LIV effects, and paves the way for future population studies with the Cherenkov Telescope Array (CTA).

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