

Seminar Fakulteta za fiziku

Vrijeme: srijeda, 12. ožujka 2025. u 11:30

Mjesto: O-155, Fakultet za fiziku, Sveučilišni kampus, Radmile Matejčić 2

Jezik: engleski

Testing Lorentz Invariance Violation on Observations of Energy-dependent Time Delays with Imaging Atmospheric Cherenkov Telescopes, status and outlook

Sami Caroff

LAPP/CNRS - Annecy – France

Abstract

Lorentz invariance - a foundational symmetry of Einstein's theory of relativity - may be subtly broken in certain quantum gravity scenarios, potentially leading to an energy-dependent dispersion in the propagation of high-energy photons. This seminar will review the current status of testing Lorentz Invariance Violation (LIV) through the observation of energy-dependent time delays using Imaging Atmospheric Cherenkov Telescopes (IACTs). We will outline the modelling framework used to test modifications to photon arrival times and its link to a fundamental energy scale. We will describe the data analysis techniques employed to detect short time shifts in gamma-ray emissions from various astrophysical sources. By examining recent observational campaigns, we will discuss the constraints placed on LIV parameters and detail the statistical methods used to assess the detection of time delays, along with the challenges posed by systematic uncertainties. Finally, we will provide an outlook on future prospects, highlighting the anticipated advancements in IACT sensitivity and analysis methodologies that may push the boundaries of current LIV limits, thereby offering deeper insights into possible quantum gravity effects.

About the speaker

Sami Caroff is a member of the LST-CTAO collaboration, where he plays a significant role in developing the software for the LST telescopes and analyzing their early science data. He is actively exploring physics beyond the Standard Model, with a particular focus on quantum gravity signatures. His work includes contributing to the early science data analysis for LST1-4 - primarily focusing on flaring AGN and GRBs - and leading the development of analysis codes to test Lorentz Invariance Violation using Imaging Atmospheric Cherenkov Telescope data.