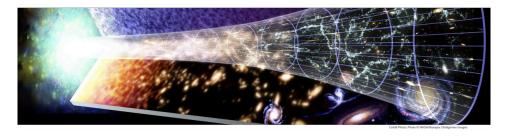ID de Contribution: **30**   Type: **Non spécifié**

Probing the Distance Duality Relation with Genetic Algorithms using Pantheon+, SH0ES and DESI 2024 Data

mardi 15 avril 2025 17:25 (25 minutes)

The distance duality relation (DDR) relates two important cosmological distances, namely the angular diameter distance and the luminosity distance. These can be measured by baryon acoustic oscillations (BAO) and Type Ia Supernovae, respectively. Here, we use recent DESI 2024 and Pantheon+SH0ES data to test this fundamental relation. We employ a parametrised approach and also use model-independent Generic Algorithms (GA) which are a machine learning method where functions evolve, loosely based on biological evolution. The data are used in two different ways, one using the Pantheon+ data without cepheid calibration. In this first case, our result is 2σ apart from the DDR in the parametrised approach and has no deviation in the GA approach. In a second step, we add the big bang nucleosynthesis (BBN) value for the baryon density ω_b and calibrate the Pantheon+ data with cepheids from the SH0ES survey. This case reflects the Hubble tension since both data sets are in tension in the standard cosmological model ΛCDM. Here, we find a significant violation of the DDR in the parametrised case at 6σ. For the model-independent approach, we test this tension by adding Planck CMB data to calculate the sound horizon instead of only the BBN value. We find a much larger deviation than in the uncalibrated GA case while the violation remains at 1σ.

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