# Redshift Correction in CEERS Galaxies: A Local-Density-Based Application of the CET Framework

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**Abstract**

We present an application of the Cosmic Elastic Theory (CET) to the CEERS galaxy sample, using density-based redshift corrections. By computing local densities from galaxy positions, we derive elastic-corrected redshifts ($z_{\mathrm{CET}}$) that correlate strongly with causal structure. The results suggest that high-redshift anomalies may be partially explained by local underdensities rather than early formation. The normalized elastic pressure $\rho/\rho_{\mathrm{crit}}$ exhibits a saturation cutoff at $z \sim 0.07$, consistent with the CET transition regime.

## 1 Introduction

The Cosmic Elastic Theory (CET) postulates that redshift is not solely due to metric expansion but also arises from elastic tension accumulated in underdense regions. This effect becomes measurable when causal connectivity drops below a critical threshold. In this study, we apply CET to CEERS galaxies with spectroscopic redshifts ($z_{\mathrm{spec}}$), photometric data, and spatial positions. We compute the local density and derive $z_{\mathrm{CET}}$ using:

$$z_{\mathrm{CET}} = z_{\mathrm{obs}} \cdot \left(1 - k \cdot \log_{10}\left(\frac{\rho_{\mathrm{crit}}}{\rho}\right)\right) \tag{1}$$

with $k = 0.05$ and $\rho_{\mathrm{crit}} = 2.8 \times 10^{-26}\mathrm{kg/m}^3$.

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## 2 Methodology

Local densities were calculated using a spherical comoving volume centered on each galaxy, normalized by the critical density. Galaxies with complete spatial and redshift information were retained. The elastic correction $z_{\mathrm{CET}}$ was then applied and analyzed against observed redshifts.

## 3 Results

### Figure 1: $z_{\mathbf{spec}}$ vs $z_{\mathbf{CET}}$

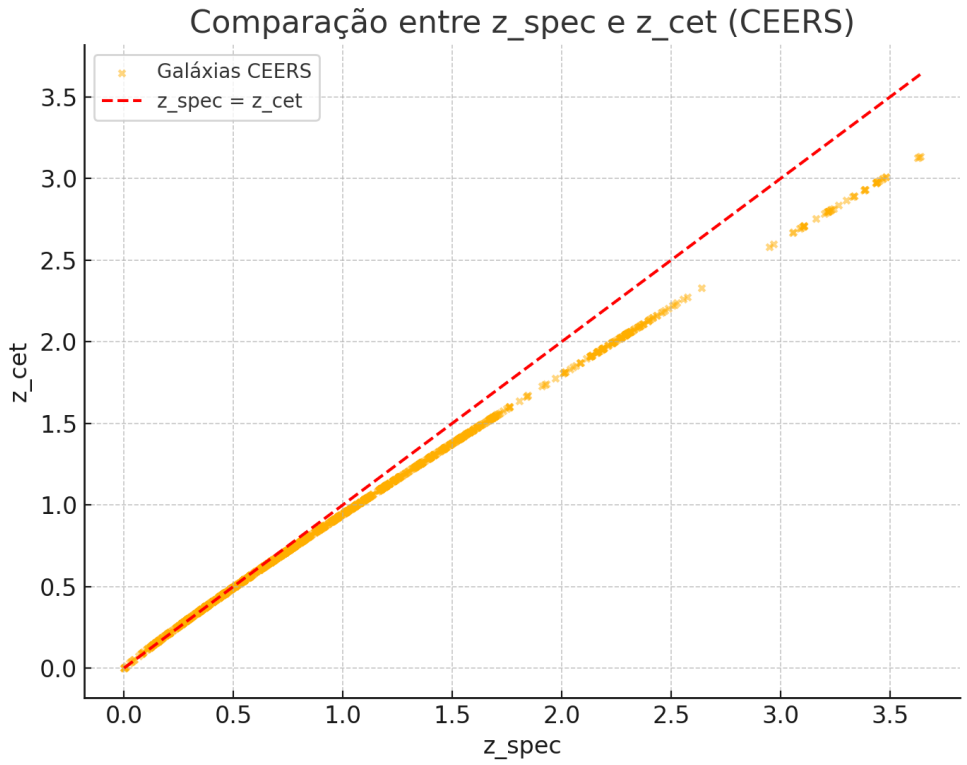


Figure 1: Comparison between spectroscopic redshift and CET-corrected redshift. The dashed line marks $z_{\mathrm{spec}} = z_{\mathrm{CET}}$.

## Figure 2: $\Delta z$ vs Density

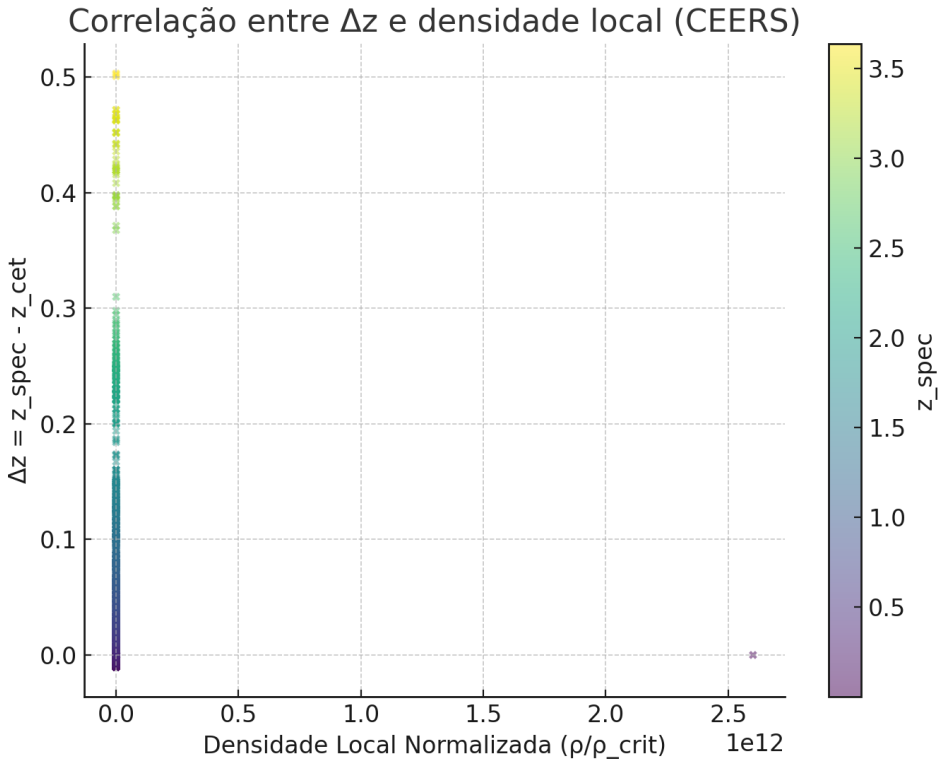


Figure 2: Correlation between redshift difference $\Delta z = z_{\text{spec}} - z_{\text{CET}}$ and normalized density. A causal cutoff is seen around $\rho/\rho_{\text{crit}} \sim 1$.

## Figure 3: 3D Redshift Correction

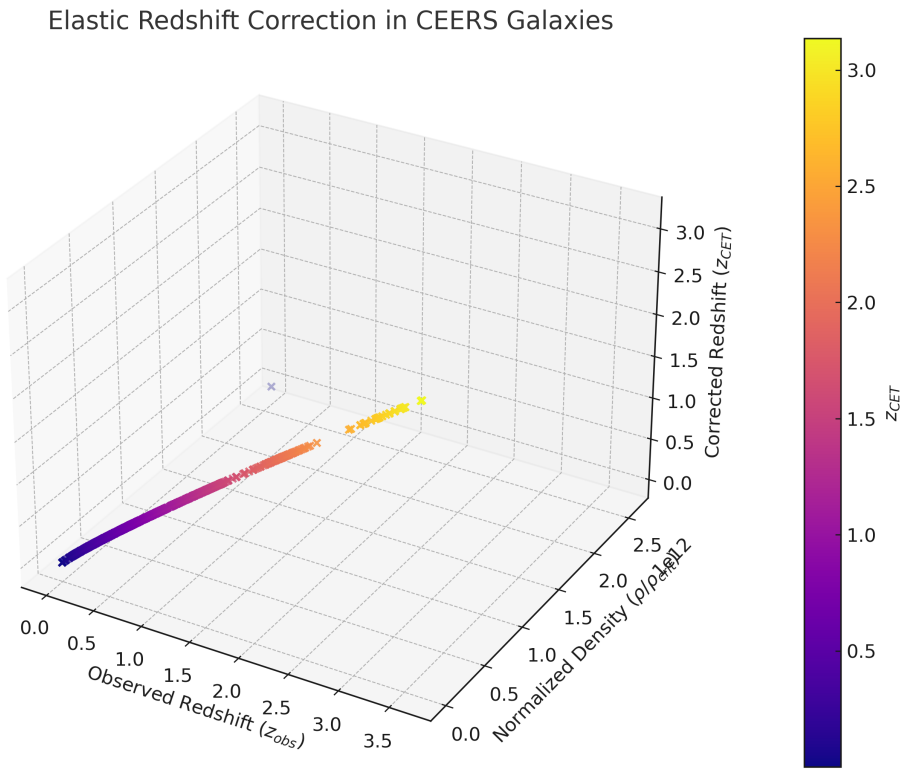


Figure 3: Elastic correction shown in 3D: $z_{\text{obs}}$, normalized density, and $z_{\text{CET}}$. A sharp transition near $z \sim 0.07$ is evident.

**Figure 4: $\Delta z$ vs $z_{\text{spec}}$ Colored by Density**

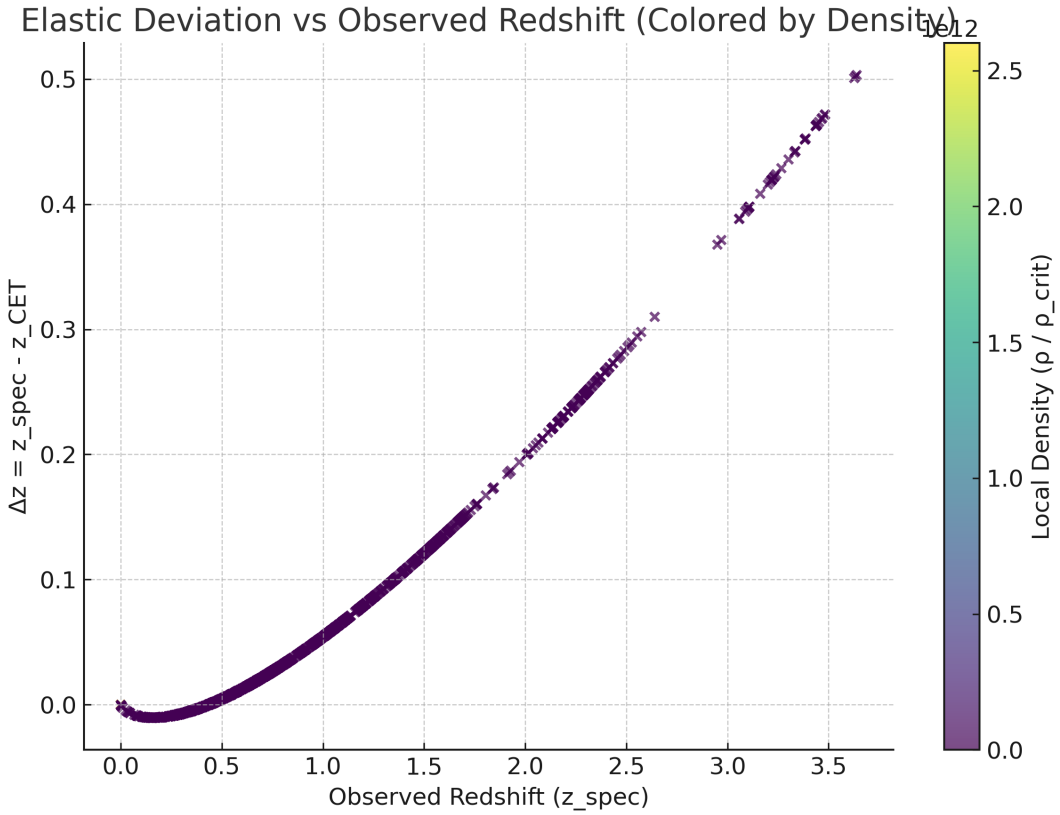


Figure 4: Elastic deviation increases with redshift and is modulated by local density.

# 4 Conclusion

Elastic redshift correction using local density reveals consistent deviations in CEERS galaxies. The saturation transition and density correlation support CET's interpretation of redshift as an emergent property of causal disconnection, not just expansion.