Variable Light Speed and the s_0 / s_1 Entropic States

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Abstract

This note situates variable light speed inside the Energy-Flow Cosmology (EFC) framework. Instead of treating c as a primitive constant, we view the effective speed of light as an emergent property of the entropic transition between two fundamental states: a low-entropy ground configuration s_0 and an active flow state s_1. The s_0/s_1 structure constrains information capacity, energy-flow geometry, and thus the maximum propagation rate of signals.

1 Motivation

Within EFC, the universe is described as a thermodynamic flow system. Energy, entropy, and information capacity are primary; geometry and observed constants emerge from them. In this view, the speed of light is not an isolated postulate but the observable limit of information transfer in a given entropic environment.

Two coarse-grained states are central:

- s_0: a near-ground, low-entropy, low-curvature configuration with few active degrees of freedom.
- s_1: an excited, high-entropy, structured configuration with active energy flow and curvature.

The transition between these states controls the local causal structure.

2 The s_0 state

The s_0 state is characterized by:

- minimal entropy production,
- weak or nearly uniform energy-flow fields,
- low information density,
- weak curvature in the effective grid.

In this regime, entropic drag on propagation is minimal, and the effective light speed c_{eff} approaches a maximal value c_0 set by the underlying grid-scale dynamics.

3 The s_1 state

The s_1 state is characterized by:

- higher entropy and entropy production,
- strong, structured energy flows,
- increased information density,
- locally enhanced curvature and distortion in the grid.

Here, propagation interacts with gradients and structure. The effective light speed is reduced compared to s_0 because signals traverse an entropically "rough" medium.

4 An entropic view of c_{eff}

At a coarse level we can write

$$c_{\text{eff}} = c_0\, f(s_0, s_1),$$

where f encodes how the local balance between s_0 and s_1 constrains propagation. Regions dominated by s_0 (high coherence, low entropy) yield $f \approx 1$, while strongly s_1-dominated regions yield $f < 1$.

In the full EFC picture, f is not a free function but is tied to:

- the local energy-rate density,
- the available information capacity,
- the entropic gradient across the grid,
- the halo and cluster-scale flow structures.

5 Cosmological implications

An entropic, state-dependent c_{eff} implies:

- light-speed anisotropy across different large-scale environments,
- redshift behaviour that couples to entropy and flow, not bare expansion alone,
- modified time delays in lensing and cluster environments,
- a route to explain some observations attributed to dark energy or exotic modifications.

These are not introduced as separate mechanisms but fall out of how s_0/s_1 structure the grid.

6 Conclusion

In EFC, the speed of light is not a sacred constant but an emergent limit shaped by entropic state. The s_0 and s_1 states form the minimal language for describing how information moves through the grid. Variable light speed then becomes a diagnostic of underlying entropic structure, rather than a violation of relativity.