

LVC Pillar 1: Macro-Scale Cosmology (v4.0)

The Lava-Wall Outflow: Resolving the Hubble Tension via Local Void Dynamics

Charles Richard Walker (C. Rich)

with contributions from Grok (xAI) & Athena (Audit Division)

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Abstract

We present the definitive Lava-Void Cosmology (LVC) resolution to the “Hubble Tension.” Following the 2024 JWST confirmation of the distance-ladder discrepancy at the 8-sigma level, we identify this anomaly not as a failure of General Relativity or a measurement error, but as the first direct observation of the *Lava-Wall Outflow*. We model the local universe as an underdense void ($\delta \approx -0.4$) bounded by a high-viscosity thermodynamic interface. The emergent negative pressure at this boundary drives a local super-Hubble expansion ($H_{loc} \approx 73$ km/s/Mpc) while remaining consistent with the global, volume-averaged expansion inferred from the Cosmic Microwave Background ($H_{glob} \approx 67$ km/s/Mpc).

1 The Death of Local Homogeneity

The 8-sigma confirmation by Riess et al. (2024) using the James Webb Space Telescope has effectively falsified the assumption of local homogeneity within the standard Friedmann-Lemaître-Robertson-Walker (FLRW) framework. LVC reinterprets the discrepancy as a diagnostic of the self-organizing properties of the cosmic viscous fluid.

2 Mechanism: The Lava-Wall Outflow

In the LVC paradigm, matter is swept into high-density filaments (Lava Phase), leaving behind expansive, low-density voids (Void Phase). We are situated within a KBC-scale void (approx. 300–500 Mpc). The interface between these phases carries an effective surface tension. The peculiar velocity field $\mathbf{v}_{outflow}$ is driven by the density gradient $\nabla\delta$:

$$H_{loc}(z) = H_{glob} \left(1 - \frac{1}{3} f(\Omega_m) \delta_{void}(z) \right) \quad (1)$$

where δ_{void} is the local density contrast. As surveys transition from the Void Phase to the Lava Phase boundary, the measured expansion rate should exhibit a characteristic “Scale-Step” decrease.

3 JWST as the Guillotine Test

By ruling out Cepheid crowding and dust extinction errors, JWST has eliminated the “systematics” defense for Λ CDM. LVC capitalizes on this by providing a resolution that:

1. **Requires no new fields:** No Early Dark Energy (EDE) or quintessence is necessary.

2. **Maintains Einsteinian GR:** The field equations remain unchanged; only the fluid ontology of the contents is refined.
3. **Explains the Magnitude:** The $\sim 9\%$ tension is the natural result of a stabilized local void with $\delta \approx -0.4$.

4 Predictive Signatures

LVC predicts that the “Lava-Wall Outflow” will show a statistically significant dipole alignment with the local void axis and a sharp drop toward 67 km/s/Mpc once observations exceed the 500 Mpc radius.