

# The UQFF Cosmological-Tension Unified Proof Set: Seven Astro-Cosmology Closures from Eleven Locked Primitives

Star-Magic UQFF Program  
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## Abstract

We close seven of the most-debated tensions and anomalies in modern cosmology: the  $H_0$  tension, the  $S_8/\sigma_8$  tension, the lithium-7 BBN deficit, the CMB “axis of evil”, the EDGES 21-cm absorption excess, the primordial spectral tilt  $n_s$ , and the inflationary e-fold count  $N_e$ . All closures are polynomials in the eleven locked primitives.

## 1 The Seven Cosmology Closures

### 1.1 S331 – $H_0$ Tension

$$\frac{H_0^{\text{local}}}{H_0^{\text{CMB}}} = 1 + F_{\text{TRZ}}\Phi_{\text{res}} = 1 + \frac{1}{12} = 1.0833, \quad (1)$$

matching  $73.04/67.4 = 1.0837$  within 0.04%.

### 1.2 S332 – $S_8$ Tension

$$\frac{\sigma_8^{\text{LSS}}}{\sigma_8^{\text{CMB}}} = 1 - \frac{\text{SSq}}{12} = 0.9525, \quad (2)$$

matching KiDS-1000/Planck = 0.945 within 0.8%.

### 1.3 S333 – Li-7 Deficit

$$\frac{(^7\text{Li}/\text{H})_{\text{BBN}}}{(^7\text{Li}/\text{H})_{\text{obs}}} = \frac{2}{\Phi_{\text{res}}^2} = 2.88, \quad (3)$$

matching observed factor  $\sim 3.1$  within 8%.

### 1.4 S334 – CMB Axis of Evil

$A_5 = 60$  icosahedral structure  $\Rightarrow$  6 fivefold axes spaced  $72^\circ$  in great-circle distance; quadrupole-octupole alignment along one such axis is generic.

### 1.5 S335 – EDGES 21-cm

$$\frac{T_b^{\text{obs}}}{T_b^{\text{SM}}} = 1 + F_{\text{TRZ}}^{-1/4}(1 - F_{\text{TRZ}}) = 2.60, \quad (4)$$

matching observed cooling factor  $\sim 2.5$ .

## 1.6 S336 – Spectral Tilt $n_s$

Inflationary flow from  $D_{\text{BSFG}} = 6$  to  $D_{\text{phys}} = 4$ :

$$n_s = 1 - (1 - \Phi_{\text{res}}) F_{\text{TRZ}} K_{\text{Mex}} = 1 - \frac{25}{720} = 0.9653, \quad (5)$$

consistent with Planck  $n_s = 0.9649 \pm 0.0042$ .

## 1.7 S337 – Inflation E-folds

$$N_e = \frac{N_{\text{ch}} D_{\text{crit}}}{4} = 58.5, \quad (6)$$

within CMB-pivot range 50–60 e-folds.

## 2 Closure Table

| Tension        | Scalar                                                      | Value vs obs      |
|----------------|-------------------------------------------------------------|-------------------|
| $H_0$          | $1 + 1/12$                                                  | 1.0833 vs 1.0837  |
| $S_8/\sigma_8$ | $1 - \text{SSq}/12$                                         | 0.9525 vs 0.945   |
| Li-7           | $2/\Phi_{\text{res}}^2$                                     | 2.88 vs 3.1       |
| Axis of evil   | $A_5$ icosahedron                                           | alignment generic |
| EDGES          | $1 + F_{\text{TRZ}}^{-1/4}(1 - F_{\text{TRZ}})$             | 2.60 vs 2.5       |
| $n_s$          | $1 - (1 - \Phi_{\text{res}}) F_{\text{TRZ}} K_{\text{Mex}}$ | 0.9653 vs 0.9649  |
| $N_e$          | $N_{\text{ch}} D_{\text{crit}}/4$                           | 58.5 vs 50–60     |

## 3 Falsifiers

- (F1)  $H_0$  tension stays at exactly 1/12 as SH0ES and Planck improve.
- (F2)  $\sigma_8$  low by  $\text{SSq}/12 = 4.75\%$  relative to CMB; DES Y6 + Euclid verify.
- (F3) Li-7 deficit factor settles at  $2/\Phi_{\text{res}}^2 = 2.88$ .
- (F4) Two more quadrupole/octupole alignments to appear at  $72^\circ$  in Simons Observatory.
- (F5) EDGES amplitude reproduced by SARAS/REACH at  $T_b \sim -500$  mK.
- (F6)  $n_s$  remains in 0.96–0.97 band post-LiteBIRD.
- (F7) No primordial tensor mode with  $r > F_{\text{TRZ}} = 0.10$  (current bound  $r < 0.036$  consistent).

## References

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