Subject: Submission: Observed Galaxy Abundances at z > 6

Dear Editor,

I am pleased to submit the manuscript entitled "Observed Galaxy Abundances at z > 6 Exceed Halo-Limited Predictions in COSMOS-Web" for consideration as a Letter in your journal.

Using the newly released COSMOS2025 catalog from the JWST COSMOS-Web survey, we identify 7,837 massive galaxies (log $M_*/M_\odot > 9$) at redshifts $z > 5$ and compare their number densities to both forward-modeled theoretical expectations and the absolute upper bound imposed by dark-matter halo abundances, assuming 100% baryon-to-star conversion efficiency ($\varepsilon = 1$).

Our principal empirical result is that, at $z \gtrsim 8$, the observed galaxy abundances exceed even this maximal, unphysical halo limit by factors of approximately 3–10. Because $\varepsilon = 1$ already corresponds to zero feedback, perfect duty cycle, and maximal star-formation efficiency, the discrepancy cannot be alleviated by adjustments to conventional galaxy-formation parameters.

We further demonstrate that:

1. The excess increases monotonically with redshift.
2. Independent support is provided by elevated specific star-formation rates, which correlate with redshift (Spearman $\rho \approx 0.33$, $p \ll 0.01$).
3. The tension remains robust under deliberately pessimistic assumptions, including combined photometric contamination, stellar-mass systematics, and $\pm 3\sigma$ cosmic variance, where the excess persists at $\gtrsim 3\times$.

The analysis is entirely empirical and intentionally model-agnostic. We do not propose a specific theoretical resolution; rather, we establish a quantitative observational constraint that any successful model of early galaxy formation must satisfy.

The manuscript has not been submitted elsewhere. All data products and analysis code are provided as supplementary material to ensure full reproducibility.

Thank you for your consideration.

Sincerely,

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