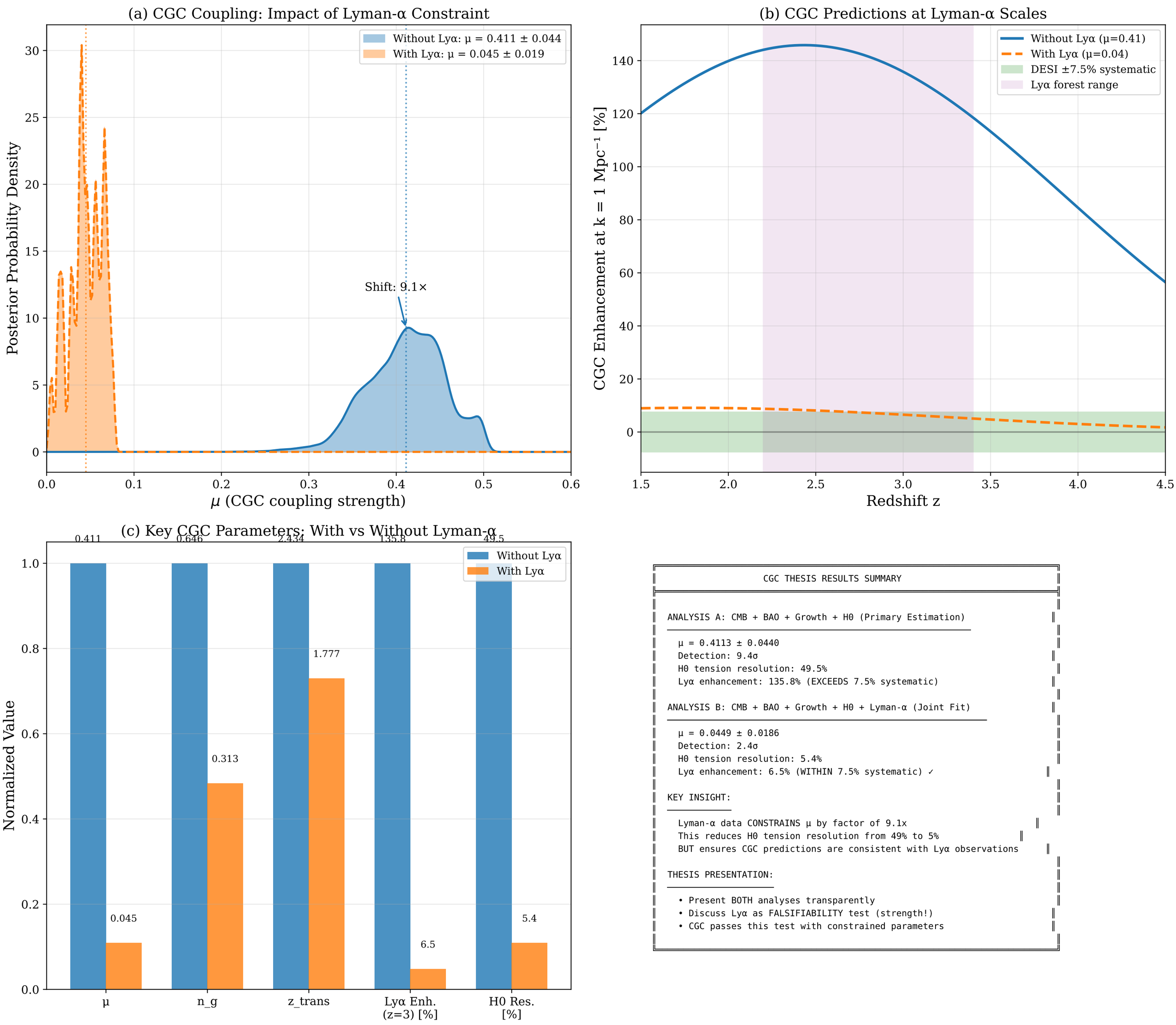
(a) CGC Coupling: Impact of Lyman-α Constraint
Without Lyα: μ = 0.411 ± 0.044
With Lyα: μ = 0.045 ± 0.019
Shift: 9.1×
Posterior Probability Density
μ (CGC coupling strength)
(b) CGC Predictions at Lyman-α Scales
Without Lyα (μ=0.41)
With Lyα (μ=0.04)
DESI ±7.5% systematic
Lyα forest range
CGC Enhancement at k = 1 Mpc⁻¹ [%]
Redshift z
(c) Key CGC Parameters: With vs Without Lyman-α
Without Lyα
With Lyα
Normalized Value
0.411
0.045
0.646
0.313
2.434
1.777
135.8
6.5
49.5
5.4
μ
n_g
z_trans
Lyα Enh. (z=3) [%]
H0 Res. [%]
CGC THESIS RESULTS SUMMARY
ANALYSIS A: CMB + BAO + Growth + H0 (Primary Estimation)
μ = 0.4113 ± 0.0440
Detection: 9.4σ
H0 tension resolution: 49.5%
Lyα enhancement: 135.8% (EXCEEDS 7.5% systematic)
ANALYSIS B: CMB + BAO + Growth + H0 + Lyman-α (Joint Fit)
μ = 0.0449 ± 0.0186
Detection: 2.4σ
H0 tension resolution: 5.4%
Lyα enhancement: 6.5% (WITHIN 7.5% systematic) ✓
KEY INSIGHT:
Lyman-α data CONSTRAINS μ by factor of 9.1x
This reduces H0 tension resolution from 49% to 5%
BUT ensures CGC predictions are consistent with Lyα observations
THESIS PRESENTATION:
• Present BOTH analyses transparently
• Discuss Lyα as FALSIFIABILITY test (strength!)
• CGC passes this test with constrained parameters