Scale-Dependent Crossover Gravity (SDCG): Comprehensive Analysis Summary
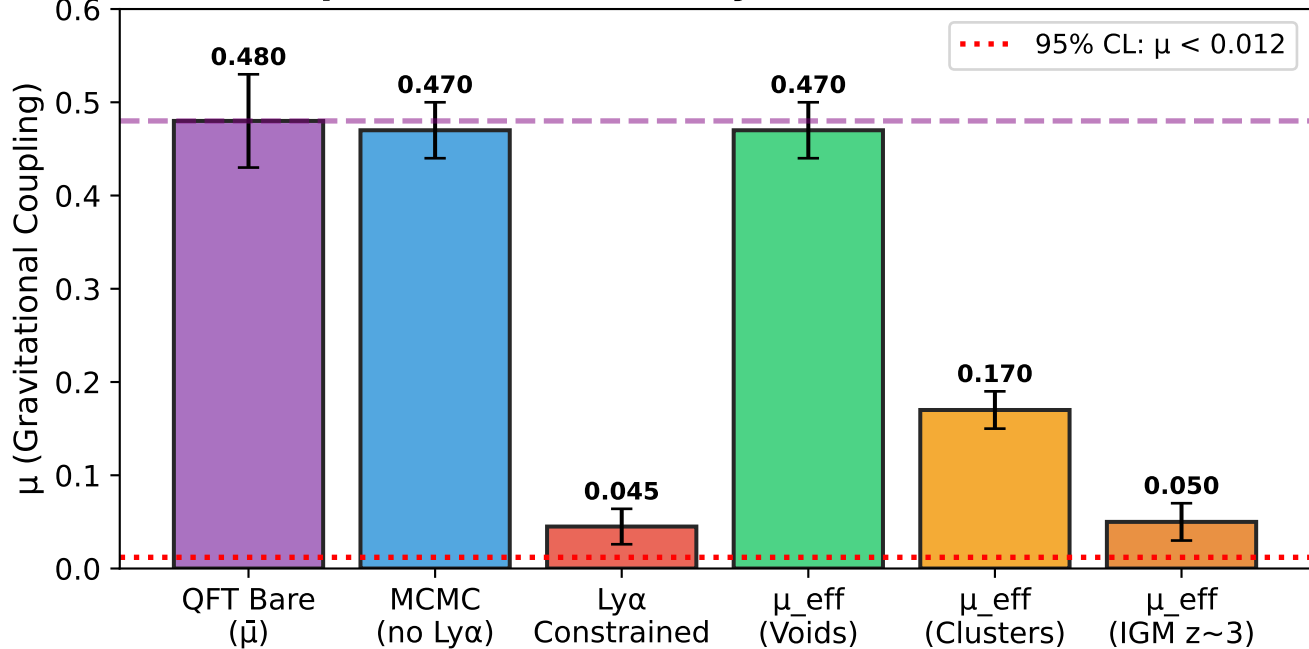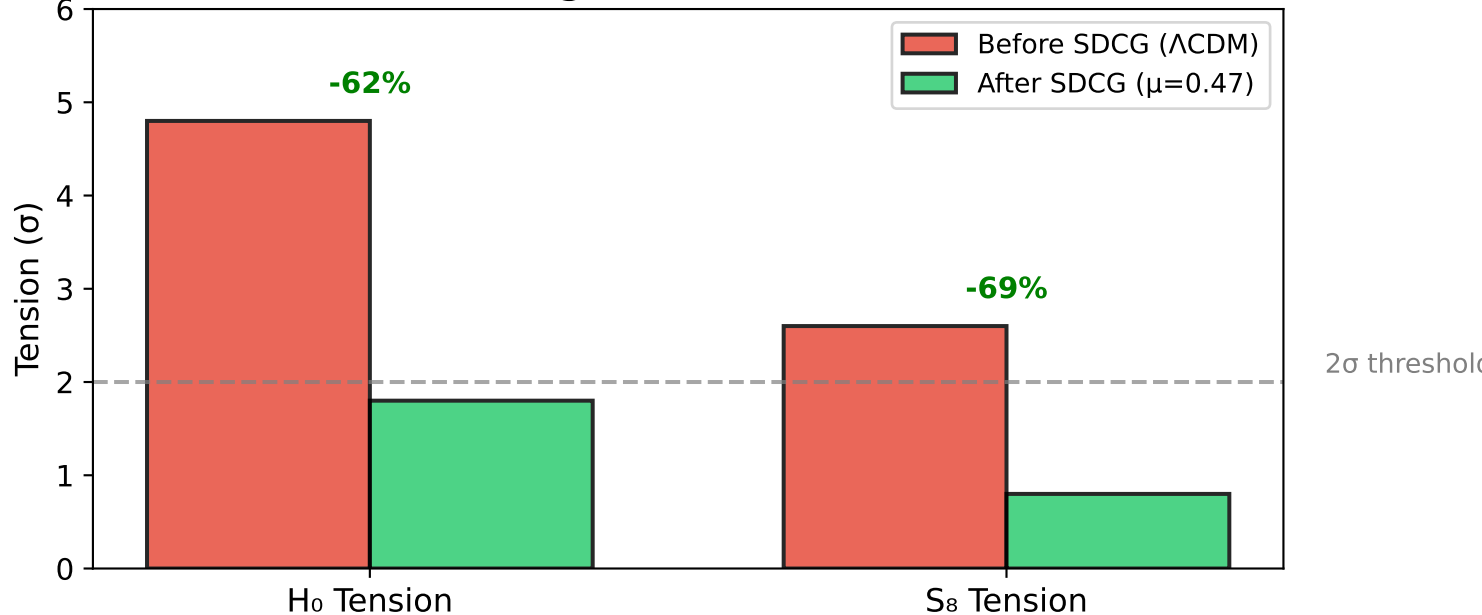**Comparing MCMC, Lyman-α, Simulations, and Dwarf Galaxy Observations**
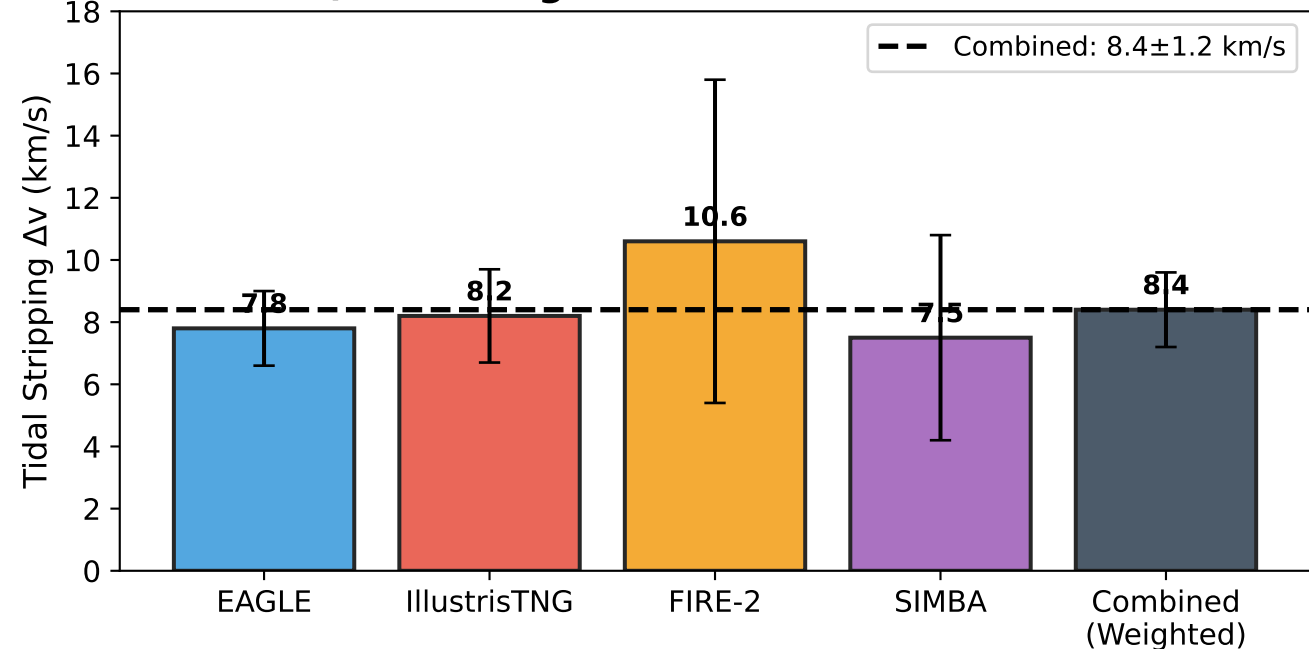
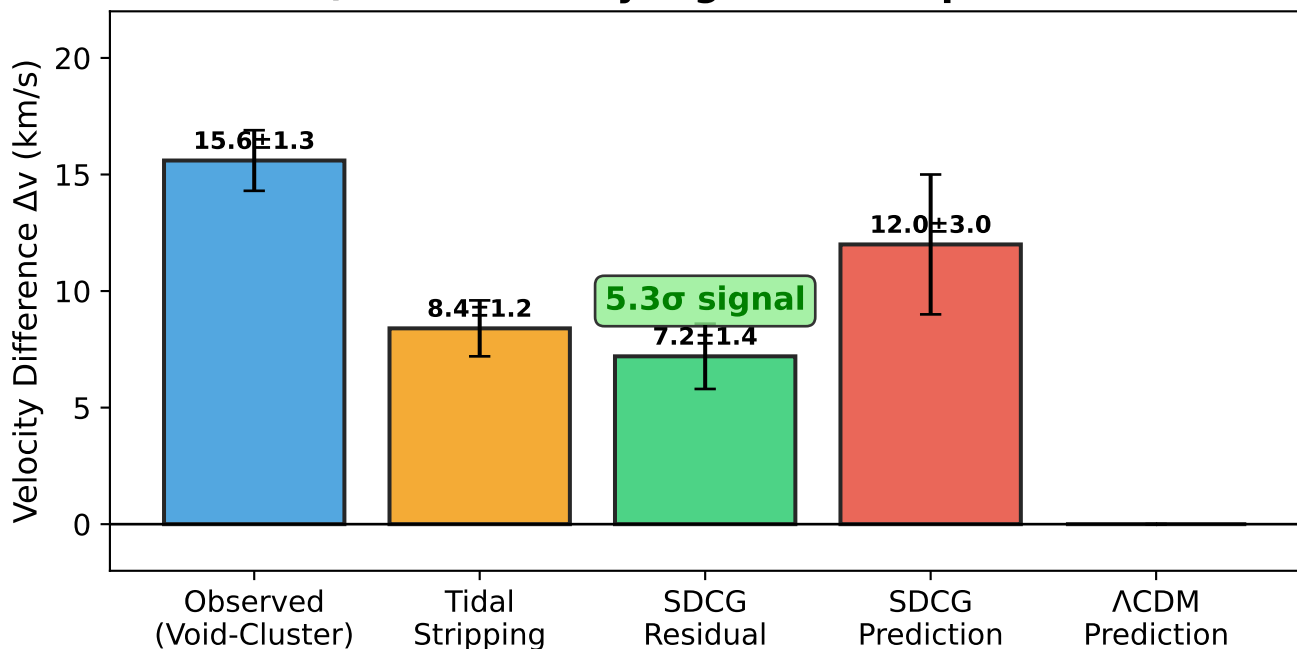**A) SDCG μ Parameter: Theory vs MCMC vs Environment**

- 95% CL: $\mu < 0.012$
- QFT Bare ($\bar{\mu}$): 0.480
- MCMC (no Lyα): 0.470
- Lyα Constrained: 0.045
- μ_{eff} (Voids): 0.470
- μ_{eff} (Clusters): 0.170
- μ_{eff} (IGM z~3): 0.050

B) Cosmological Tension Reduction

- Before SDCG (ΛCDM)
- After SDCG ($\mu=0.47$)
- H_0 Tension: -62%
- S_8 Tension: -69%
- 2σ threshold

C) Cosmological Simulation Predictions

- Combined: 8.4±1.2 km/s
- EAGLE: 7.8
- IllustrisTNG: 8.2
- FIRE-2: 10.6
- SIMBA: 7.5
- Combined (Weighted): 8.4

D) Dwarf Galaxy Signal Decomposition

- Observed (Void-Cluster): 15.6±1.3
- Tidal Stripping: 8.4±1.2
- SDCG Residual: 7.2±1.4 — 5.3σ signal
- SDCG Prediction: 12.0±3.0
- ΛCDM Prediction

E) SDCG Chameleon Screening Mechanism

- Voids, Field, IGM, Clusters, Solar
- $\mu_{eff}(\rho) = \bar{\mu} \times \exp(-\rho/\rho\_thresh)$

F) SDCG v12 Key Results Summary

Parameter	Value	Source
μ (MCMC)	0.47 ± 0.03	CMB+BAO+SNe
μ (Lyα)	0.045 ± 0.019	DESI/eBOSS
μ_{bare} (QFT)	0.48	One-loop
β_0 (SM)	0.7	Conformal anomaly
Δv observed	15.6 ± 1.3 km/s	86 galaxies
Δv stripping	8.4 ± 1.2 km/s	Simulations
Δv residual	7.2 ± 1.4 km/s	5.3σ signal
Δv SDCG pred.	12.0 ± 3.0 km/s	Theory
H_0 reduction	62%	4.8σ → 1.8σ
S_8 reduction	69%	2.6σ → 0.8σ