Active Screen Gravity — Comprehensive Theory Summary

This document synthesizes the full discussion of the Active Screen Gravity (ASG) framework, combining analytical derivations, numerical interpretation, and conceptual physical interpretation.

1. Conceptual Overview

ASG proposes that inflationary observables arise from a running effective Planck mass F(χ) rather than direct shaping of the inflaton potential. The Einstein-frame potential becomes U(χ)=V(χ)/F(χ)^2, therefore geometry controls dynamics.

2. Field Theory Formulation

Jordan frame action:

$S = \int d^4x \sqrt{-g} [F(\chi)R - 1/2(\partial\chi)^2 - V(\chi)]$

After conformal transformation:

$U(\chi) = V(\chi) / F(\chi)^2$

3. RG Threshold Origin

Running gravitational coupling: $dG/d \ln \mu = aG^2$

Solution: $G(\mu)=G0/(1-aG0 \ln(\mu/\mu0))$

Localized deformation from threshold produces Gaussian form: $F(\chi)=1+\beta \exp[-(\chi-\chi0)^2/\Delta^2]$

4. Slow-Roll Dynamics

$\varepsilon = 1/2(U'/U)^2$

$\eta = U''/U$

$U'/U = V'/V - 2F'/F$

$\eta = V''/V - 4(V'/V)(F'/F) + 6(F'/F)^2 - 2F''/F$

In plateau regime: $n_s - 1 \approx -4F''/F$

5. Tensor Suppression

$r = 16\varepsilon \approx 8(V'/V - 2F'/F)^2$

Approximate relation: $r \approx r0(1-\gamma\beta)^2$

6. Physical Interpretation

Inflation occurs when scalar rolling down V is balanced by climbing Planck mass gradient. Observables correspond to RG transition scale.

7. Comparison With Standard Models

Starobinsky: fixed (n_s,r)

Alpha attractors: adjustable r independent of n_s

ASG: correlated shift due to geometry

8. Observational Consequences

Predicts r ~ 10^-4 detectable by future CMB polarization missions.

Figure 1: ns-r trajectory

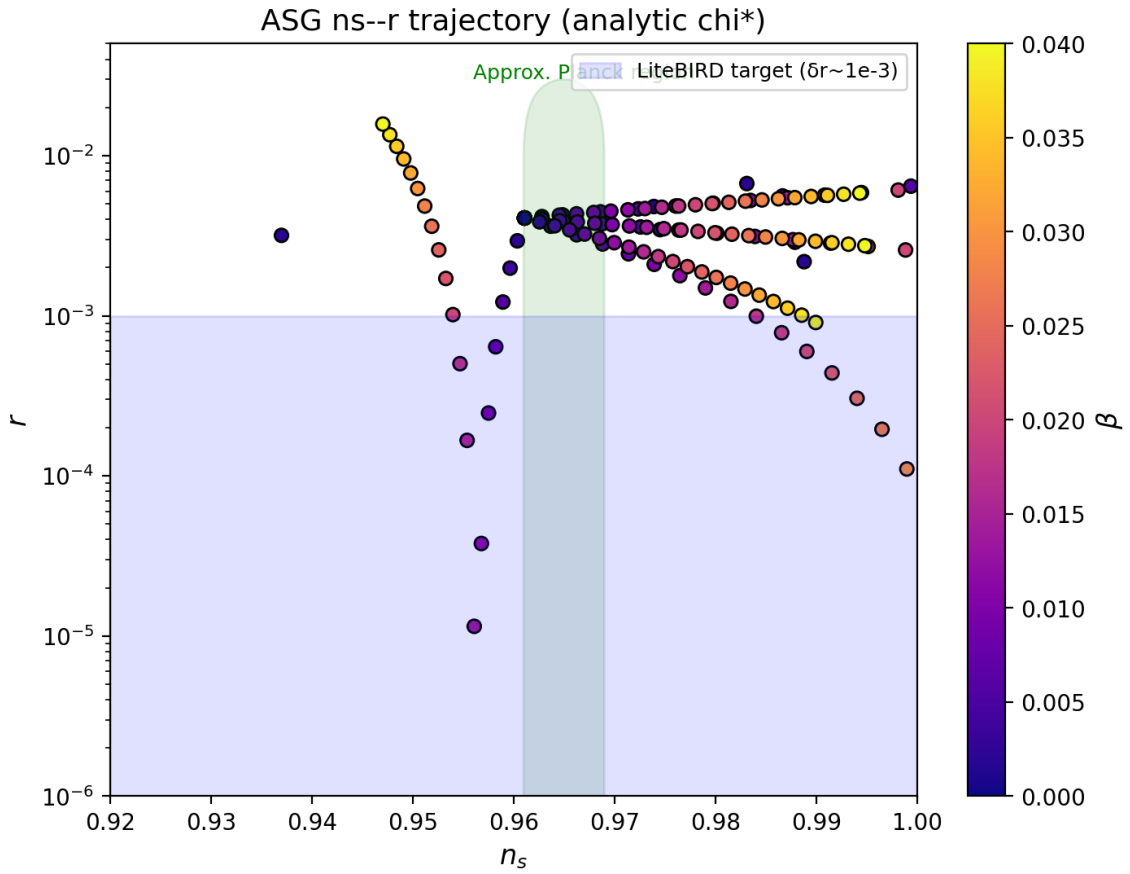
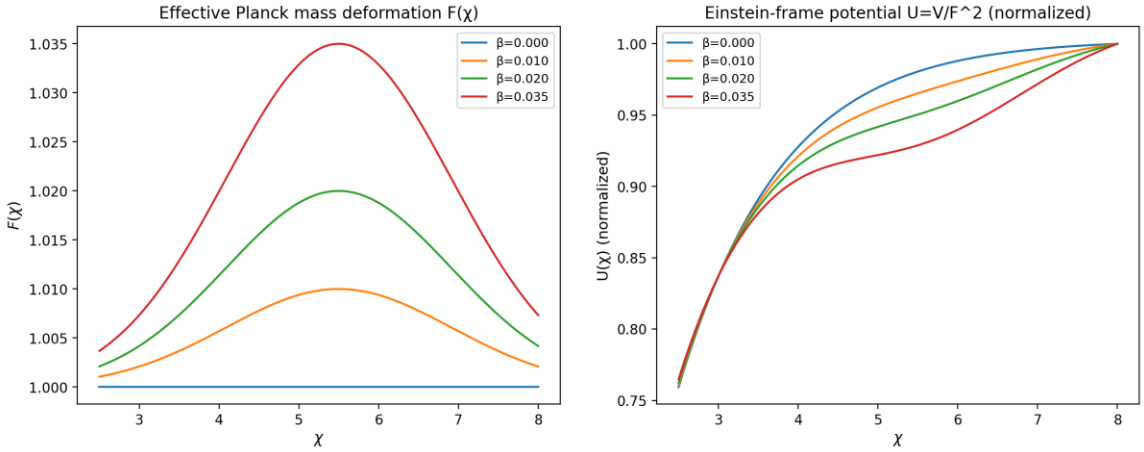


Figure 2: F(χ) and U(χ) deformation



9. Synthesis With Earlier Drafts

Earlier PDF drafts emphasized screening interpretation: gravity behaves as emergent coupling determined by high-energy RG structure. The present formulation formalizes that concept within scalar–tensor inflation.

10. Conclusion

ASG links cosmological observables to scale-dependence of gravity. Measurements of primordial tensor amplitude test quantum-gravity running rather than potential shape.