Active Screen Gravity (ASG) – Comprehensive Hypothesis Summary

Concept

ASG proposes that the effective Planck mass is not fundamental but emergent.

Gravity strength varies because vacuum polarization of quantum fields modifies spacetime stiffness.

The macroscopic description is a scalar-tensor theory where $F(\chi)$ acts as a dynamical Planck mass.

Core Equations

Action:

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

Effective gravity:

$$G\_eff = 1 / (8\pi F(\chi))$$

RG-motivated running:

$$dG/d\ln\mu = a\, G^2$$

$\Rightarrow F(\chi)$ reconstructed phenomenologically from RG flow

Physical Interpretation

χ represents collective vacuum polarization degrees of freedom.

The model unifies:

• Inflation (UV plateau)

• Late acceleration (IR slow drift)

• Strong-gravity deviations near horizons

Predictions

Inflation:

$n\_s \approx 0.96$ plateau behavior

Low tensor ratio

Dark Energy:

w ≈ −1 with slow evolution

Strong Gravity:

possible echo reflectivity from curvature-induced screening breakdown

Research Program

1. Planck spectrum consistency

2. Mukhanov-Sasaki perturbations

3. Black-hole wave scattering

4. Reconstruction of $F(\chi)$ from particle vacuum polarization