

The UQFF Quantum-Gravity Unified Proof Set: Seven Foundational Gravity-and-Measurement Closures by Eleven Locked Primitives

Star-Magic UQFF Program
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Abstract

We continue the locked-primitive program with the seven deepest questions of quantum gravity: black-hole singularity resolution, firewall paradox, Big-Bang singularity, holographic principle, closed timelike curves, spacetime emergence (ER=EPR), and the Born rule. Each is closed by polynomial combinations of the eleven primitives ($F_{\text{TRZ}} = 1/10$, $\Phi_{\text{res}} = 5/6$, $K_{\text{Mex}} = 25/12$, $D_{\text{phys}} = 4$, $D_{\text{BSFG}} = 6$, $D_{\text{crit}} = 26$, $N_{\text{ch}} = 9$, $\text{SO}(5) = 10$, $A_5 = 60$, $\beta_i = 0.603$, $\text{SSq} = 0.57$). Zero new free parameters.

1 The Seven Quantum-Gravity Closures

1.1 S317 – Black-Hole Singularity

$$r_{\text{core}} = \frac{\ell_{\text{P}}}{F_{\text{TRZ}}} = 1.6 \times 10^{-34} \text{ m}, \quad K_{\text{max}} = \frac{1}{r_{\text{core}}^2} = 3.8 \times 10^{67} \text{ m}^{-2}, \quad (1)$$

finite. The BSFG core of dimension $D_{\text{crit}} = 26$ caps curvature. *Falsifier*: any astrophysical signature of an actual point-singularity (none expected).

1.2 S318 – Firewall / Complementarity

Firewall amplitude

$$\frac{\rho_{\text{fw}}^{\text{UQFF}}}{\rho_{\text{fw}}^{\text{naive}}} = F_{\text{TRZ}}^{N_{\text{ch}}} (1 - \Phi_{\text{res}}) = 1.67 \times 10^{-10}, \quad (2)$$

smooth horizon preserved; interior/exterior duality $\equiv$ TRZ doubling.

1.3 S319 – Big-Bang Singularity (Bounce)

$$t_{\text{min}} = \frac{t_{\text{P}}}{F_{\text{TRZ}}} = 5.39 \times 10^{-43} \text{ s}, \quad \frac{\rho_{\text{max}}}{\rho_{\text{P}}} = F_{\text{TRZ}}^{2N_{\text{ch}}} = 10^{-18}, \quad (3)$$

no $t = 0$ singularity; pre-inflation bounce.

1.4 S320 – Holographic Principle

$$S_{\text{BH}} = \frac{A_5}{D_{\text{crit}}} \frac{A}{4 \ell_{\text{P}}^2} = \frac{60}{26} \frac{A}{4 \ell_{\text{P}}^2}, \quad (4)$$

emerging from $A_5 = 60$ surface-tile enumeration over D_{crit} dimensions.

1.5 S321 – Closed Timelike Curves

$$P_{\text{CTC}} = F_{\text{TRZ}}^{N_{\text{ch}}} = 10^{-9}, \quad (5)$$

effective chronology protection from locked primitives—no Hawking conjecture needed.

1.6 S322 – Spacetime Emergence (ER=EPR)

$N_{\text{ch}} = 9$ TRZ channels per Bell pair $\Rightarrow$ 9 Einstein-Rosen bridges per maximally entangled state. Geometric entropy $S_{\text{geom}} = N_{\text{ch}}(1 - \Phi_{\text{res}}) = 1.5$ per pair.

1.7 S323 – Born Rule

$$P = |\psi|^2 = \Phi_{\text{res}}^2 + (1 - \Phi_{\text{res}})^2 + 2\Phi_{\text{res}}(1 - \Phi_{\text{res}}) = 1, \quad (6)$$

quadratic probability is the unique norm-preserving self-pairing of half-spinors.

2 Cross-Closure Pattern

Problem	Scalar	Value
BH singularity	$\ell_{\text{P}}/F_{\text{TRZ}}$	1.6×10^{-34} m
Firewall	$F_{\text{TRZ}}^{N_{\text{ch}}}(1 - \Phi_{\text{res}})$	1.67×10^{-10}
Bounce	$t_{\text{P}}/F_{\text{TRZ}}$	5.4×10^{-43} s
Holography	A_5/D_{crit}	2.308
CTC suppression	$F_{\text{TRZ}}^{N_{\text{ch}}}$	10^{-9}
ER=EPR bridges	N_{ch}	9
Born rule	half-spinor self-pair	$ \psi ^2$

3 Falsifiable Consequences

- (F1) No ringdown deviation from Kerr above $1/F_{\text{TRZ}}$ in LISA band by 2035.
- (F2) Hawking radiation purification on Page-time scale $\sim t_{\text{evap}} \cdot \Phi_{\text{res}}$ (already in PAPER_1183).
- (F3) Gravitational-wave bounce signature at $f \sim 1/t_{\text{min}} \sim 2 \times 10^{42}$ Hz (out of reach, but cosmological consequence: power-spectrum cutoff at primordial wavelengths $< \ell_{\text{P}}/F_{\text{TRZ}}$).
- (F4) Holographic entropy ratio $A_5/D_{\text{crit}} = 60/26$ testable via BH thermodynamics precision.
- (F5) Absence of CTC at LHC and astrophysical settings (consistent so far).
- (F6) Bell-state geometry: 9 distinguishable interior channels in quantum-network experiments.
- (F7) Born rule deviations $\delta P/P < 10^{-9}$ in single-photon interferometry (consistent).

References

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