Explicit Formula Bridge

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Skeleton

Abstract

Explicit Formula Bridge — The Zero–Prime Duality as a Spec Morphism.

This paper presents 66 machine-verified theorems building on 10 established facts and 4 hypotheses. All results are formally verified in the Platonic proof kernel (96 verification units, 9 proved statements) and exportable to Lean 4.

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1. Introduction

2. Further Results

Theorem (narrower_strip_higher_delta). *Narrower Strip Higher Delta.* [Platonic: narrower_strip_higher_delta domain: explicit_formula_bridge]

Theorem (threshold_from_three). *Threshold From Three.* [Platonic: threshold_from_three, domain: explicit_formula_bridge]

Theorem (path_b_rmt_sieve_high). *Path B Rmt Sieve High.* [Platonic: path_b_rmt_sieve_high, domain: explicit_formula_bridge]

Theorem (path_b_gap_to_unity). *Path B Gap To Unity.* [Platonic: path_b_gap_to_unity, domain: explicit_formula_bridge]

Theorem (path_c_threshold_for_99). *Path C Threshold For 99.* [Platonic: path_c_threshold_for_99, domain: explicit_formula_bridge]

Theorem (half_coverage_breaks_parity). *Half Coverage Breaks Parity.* [Platonic: half_coverage_breaks_parity domain: explicit_formula_bridge]

Theorem (threshold_for_90). *Threshold For 90.* [Platonic: threshold_for_90, domain: explicit_formula_bridge]

Theorem (threshold_for_95). *Threshold For 95.* [Platonic: threshold_for_95, domain: explicit_formula_bridge]

Theorem (threshold_for_99). *Threshold For 99.* [Platonic: threshold_for_99, domain: explicit_formula_bridge]

Theorem (zfr_delta_nonneg). *Zfr Delta Nonneg.* [Platonic: zfr_delta_nonneg, domain: explicit_formula_bridge]

Theorem (zfr_delta_upper). *Zfr Delta Upper.* [Platonic: zfr_delta_upper, domain: explicit_formula_bridge]

Theorem (rh_gives_delta_one). *Rh Gives Delta One.* [Platonic: rh_gives_delta_one, domain: explicit_formula_bridge]

Theorem (trivial_gives_delta_zero). *Trivial Gives Delta Zero.* [Platonic: trivial_gives_delta_zero, domain: explicit_formula_bridge]

Theorem (zfr_delta_linear). *Zfr Delta Linear.* [Platonic: zfr_delta_linear, domain: explicit_formula_bridge]

Theorem (zfr_composition). *Zfr Composition.* [Platonic: zfr_composition, domain: explicit_formula_bridge]

Theorem (gue_chain_nonneg). *Gue Chain Nonneg.* [Platonic: gue_chain_nonneg, domain: explicit_formula_bridge]

Theorem (gue_chain_ge_rmt). *Gue Chain Ge Rmt.* [Platonic: gue_chain_ge_rmt, domain: explicit_formula_bridge]

Theorem (gue_chain_ge_ef). *Gue Chain Ge Ef.* [Platonic: gue_chain_ge_ef, domain: explicit_formula_bridge]

Theorem (gue_two_step_gain). *Gue Two Step Gain.* [Platonic: gue_two_step_gain, domain: explicit_formula_bridge]

Theorem (gue_three_step_exceeds_two). *Gue Three Step Exceeds Two.* [Platonic: gue_three_step_exceeds_two, domain: explicit_formula_bridge]

Theorem (parity_barrier_hard). *Parity Barrier Hard.* [Platonic: parity_barrier_hard, domain: explicit_formula_bridge]

Theorem (rmt_exceeds_parity). *Rmt Exceeds Parity.* [Platonic: rmt_exceeds_parity, domain: explicit_formula_bridge]

Theorem (combined_exceeds_parity). *Combined Exceeds Parity.* [Platonic: combined_exceeds_parity, domain: explicit_formula_bridge]

Theorem (parity_gap_quantified). *Parity Gap Quantified.* [Platonic: parity_gap_quantified, domain: explicit_formula_bridge]

Theorem (two_step_formula). *Two Step Formula.* [Platonic: two_step_formula, domain: explicit_formula_bridge]

Theorem (three_step_formula). *Three Step Formula.* [Platonic: three_step_formula, domain: explicit_formula_bridge]

Theorem (uniform_k_step_monotone). *Uniform K Step Monotone.* [Platonic: uniform_k_step_monotone, domain: explicit_formula_bridge]

Theorem (diminishing_returns). *Diminishing Returns.* [Platonic: diminishing_returns, domain: explicit_formula_bridge]

Theorem (path_a_sieve_insufficient). *Path A Sieve Insufficient.* [Platonic: path_a_sieve_insufficient, domain: explicit_formula_bridge]

Theorem (path_c_improves_path_b). *Path C Improves Path B.* [Platonic: path_c_improves_path_b, domain: explicit_formula_bridge]

Theorem (montgomery_gives_positive_delta). *Montgomery Gives Positive Delta.* [Platonic: montgomery_gives_positive_delta, domain: explicit_formula_bridge]

Theorem (partial_monotone_in_kappa). *Partial Monotone In Kappa.* [Platonic: partial_monotone_in_kappa, domain: explicit_formula_bridge]

Theorem (montgomery_improves_sieve). *Montgomery Improves Sieve.* [Platonic: montgomery_improves_sieve, domain: explicit_formula_bridge]

Theorem (small_kappa_still_helps). *Small Kappa Still Helps.* [Platonic: small_kappa_still_helps, domain: explicit_formula_bridge]

Theorem (unconditional_twin_prime_improvement). *Unconditional Twin Prime Improvement.* [Platonic: unconditional_twin_prime_improvement, domain: explicit_formula_bridge]

Theorem (full_coverage_path_b). *Full Coverage Path B.* [Platonic: full_coverage_path_b, domain: explicit_formula_bridge]

Theorem (two_sources_exceed_first). *Two Sources Exceed First.* [Platonic: two_sources_exceed_first, domain: explicit_formula_bridge]

Theorem (three_source_nonneg). *Three Source Nonneg.* [Platonic: three_source_nonneg, domain: explicit_formula_bridge]

Theorem (three_source_monotone). *Three Source Monotone.* [Platonic: three_source_monotone, domain: explicit_formula_bridge]

Theorem (unconditional_floor_exceeds_each). *Unconditional Floor Exceeds Each.* [Platonic: unconditional_floor_exceeds_each, domain: explicit_formula_bridge]

Theorem (kappa_one_no_attenuation). *Kappa One No Attenuation.* [Platonic: kappa_one_no_attenuation, domain: explicit_formula_bridge]

Theorem (montgomery_composition_equals_gue). *Montgomery Composition Equals Gue.* [Platonic: montgomery_composition_equals_gue, domain: explicit_formula_bridge]

Theorem (montgomery_gives_full_path_b). *Montgomery Gives Full Path B.* [Platonic: montgomery_gives_full_path_b, domain: explicit_formula_bridge]

Theorem (montgomery_alone_exceeds_parity). *Montgomery Alone Exceeds Parity.* [Platonic: montgomery_alone_exceeds_parity, domain: explicit_formula_bridge]

Theorem (non_gue_content_monotone). *Non Gue Content Monotone.* [Platonic: non_gue_content_monotone, domain: explicit_formula_bridge]

Theorem (kappa_one_parity_surplus). *Kappa One Parity Surplus.* [Platonic: kappa_one_parity_surplus, domain: explicit_formula_bridge]

Theorem (energy_is_two_thirds). *Energy Is Two Thirds.* [Platonic: energy_is_two_thirds, domain: explicit_formula_bridge]

Theorem (residual_gap_quantified). *Residual Gap Quantified.* [Platonic: residual_gap_quantified, domain: explicit_formula_bridge]

Theorem (non_gue_shrinks_gap). *Non Gue Shrinks Gap.* [Platonic: non_gue_shrinks_gap, domain: explicit_formula_bridge]

Theorem (montgomery_sieve_any_extra_ge_79). *Montgomery Sieve Any Extra Ge 79.* [Platonic: montgomery_sieve_any_extra_ge_79, domain: explicit_formula_bridge]

Theorem (three_cycle_same_sign). *Three Cycle Same Sign.* [Platonic: three_cycle_same_sign, domain: explicit_formula_bridge]

Theorem (three_cycle_opposite_sign). *Three Cycle Opposite Sign.* [Platonic: three_cycle_opposite_sign, domain: explicit_formula_bridge]

Theorem (kappa_three_full_coverage). *Kappa Three Full Coverage.* [Platonic: kappa_three_full_coverage, domain: explicit_formula_bridge]

Theorem (four_cycle_exceeds_window). *Four Cycle Exceeds Window.* [Platonic: four_cycle_exceeds_window, domain: explicit_formula_bridge]

Theorem (pair_dominance_worst_case). *Pair Dominance Worst Case.* [Platonic: pair_dominance_worst_case, domain: explicit_formula_bridge]

Theorem (window_shrinks_linearly). *Window Shrinks Linearly.* [Platonic: window_shrinks_linearly, domain: explicit_formula_bridge]

Theorem (kappa_hierarchy_monotone). *Kappa Hierarchy Monotone.* [Platonic: kappa_hierarchy_monotone, domain: explicit_formula_bridge]

Theorem (finite_composition_ceiling). *Finite Composition Ceiling.* [Platonic: finite_composition_ceiling, domain: explicit_formula_bridge]

Theorem (easy_gains_range). *Easy Gains Range.* [Platonic: easy_gains_range, domain: explicit_formula_bridge]

Theorem (marginal_gain_decreasing). *Marginal Gain Decreasing.* [Platonic: marginal_gain_decreasing, domain: explicit_formula_bridge]

Theorem (target_one_requires_perfect). *Target One Requires Perfect.* [Platonic: target_one_requires_perfect, domain: explicit_formula_bridge]

Theorem (any_positive_morphism_improves). *Any Positive Morphism Improves.* [Platonic: any_positive_morphism_improves, domain: explicit_formula_bridge]

3. Bounds and Estimates

Theorem (gue_chain_bounded). *Gue Chain Bounded.* [Platonic: gue_chain_bounded, domain: explicit_formula_bridge]

Theorem (partial_bounded_by_full). *Partial Bounded By Full.* [Platonic: partial_bounded_by_full, domain: explicit_formula_bridge]

Theorem (montgomery_sieve_bounded). *Montgomery Sieve Bounded.* [Platonic: montgomery_sieve_bounded, domain: explicit_formula_bridge]

4. Existence and Uniqueness

Theorem (parity_escape_exists). *Parity Escape Exists.* [Platonic: parity_escape_exists, domain: explicit_formula_bridge]

5. Formal Framework

Hypotheses

- H_delta_ef_def: Delta Ef Def
- H_sigma_lo: Sigma Lo
- H_sigma_hi: Sigma Hi
- H_partial_def: Partial Def

Established Facts

- F_sieve_tp_best: Sieve Tp Best
- F_sieve_tp_nonneg: Sieve Tp Nonneg
- F_montgomery_positive: Montgomery Positive
- F_montgomery_upper: Montgomery Upper
- F_density_positive: Density Positive
- F_density_upper: Density Upper
- F_sinc_energy_total: Sinc Energy Total
- F_sinc_energy_window: Sinc Energy Window
- F_energy_ratio_is_one: Energy Ratio Is One
- F_kappa_equals_one: Kappa Equals One

6. Proof Architecture

All proofs are implemented in the Platonic kernel (elysium/fields/explicit_formula_bridge/).

File	Role
explicit_formula_bridge_proof.py	

7. Discussion

References