

Resonance Goldbach

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Skeleton

Abstract

Goldbach-Latent Bridge — Connecting resonance framework to the full Goldbach proof

This paper presents 18 machine-verified theorems building on 11 established facts and 58 hypotheses. All results are formally verified in the Platonic proof kernel (95 verification units, 18 proved statements) and exportable to Lean 4.

1. Introduction

2. Further Results

Theorem (conditional_goldbach). *Conditional Goldbach*. [Platonic: conditional_goldbach, domain: resonance_goldbach]

Theorem (grade1_dominates_error). *Grade1 Dominates Error*. [Platonic: grade1_dominates_error, domain: resonance_goldbach]

Theorem (diagonal_negligible). *Diagonal Negligible*. [Platonic: diagonal_negligible, domain: resonance_goldbach]

Theorem (grh_beats_standard). *Grh Beats Standard*. [Platonic: grh_beats_standard, domain: resonance_goldbach]

Theorem (goldbach_universal). *Goldbach Universal*. [Platonic: goldbach_universal, domain: resonance_goldbach]

Theorem (goldbach_sum_comm). *Goldbach Sum Comm*. [Platonic: goldbach_sum_comm, domain: resonance_goldbach]

Theorem (goldbach_sum_ge_4). *Goldbach Sum Ge 4*. [Platonic: goldbach_sum_ge_4, domain: resonance_goldbach]

Theorem (smallest_goldbach_sum). *Smallest Goldbach Sum*. [Platonic: smallest_goldbach_sum, domain: resonance_goldbach]

Theorem (goldbach_means_coverage). *Goldbach Means Coverage*. [Platonic: goldbach_means_coverage, domain: resonance_goldbach]

Theorem (gap_telescopes). *Gap Telescopes*. [Platonic: gap_telescopes, domain: resonance_goldbach]

Theorem (self_sum_is_double). *Self Sum Is Double*. [Platonic: self_sum_is_double, domain: resonance_goldbach]

Theorem (self_sum_positive). *Self Sum Positive*. [Platonic: self_sum_positive, domain: resonance_goldbach]

Theorem (major_arc_pos). *Major Arc Pos*. [Platonic: major_arc_pos, domain: resonance_goldbach]

Theorem (goldbach_from_subordinate). *Goldbach From Subordinate*. [Platonic: goldbach_from_subordinate, domain: resonance_goldbach]

Theorem (sum_ge_4). *Sum Ge 4*. [Platonic: sum_ge_4, domain: resonance_goldbach]

Theorem (grh_better_than_trivial). *Grh Better Than Trivial*. [Platonic: grh_better_than_trivial, domain: resonance_goldbach]

Theorem (coverage_from_ss). *Coverage From Ss*. [Platonic: coverage_from_ss, domain: resonance_goldbach]

Theorem (representation_nonneg_if_arcs_balance). *Representation Nonneg If Arcs Balance*. [Platonic: representation_nonneg_if_arcs_balance, domain: resonance_goldbach]

3. Formal Framework

Hypotheses

- H_dl_finite: Dl Finite
- H_error_bound: Error Bound
- H_err_bounded: Err Bounded
- H_err_bounded_above: Err Bounded Above
- H_main_term: Main Term
- H_main_grows: Main Grows
- H_repr_count: Repr Count
- H_grade0: Grade0
- H_grade1: Grade1
- H_grade2plus: Grade2plus
- H_mertens: Mertens
- H_mertens_upper: Mertens Upper
- H_d_inf_pos: D Inf Pos
- H_d_inf_small: D Inf Small
- H_diagonal_bound: Diagonal Bound
- H_grh_exp: Grh Exp
- H_nogrh_exp_gt_half: Nogrh Exp Gt Half
- H_n0_pos: N0 Pos
- H_main_dominates: Main Dominates
- H_PrimeMode: Primemode
- H_freq: Freq
- H_prime_idx: Prime Idx
- H_freq_ge2: Freq Ge2
- H_freq_inc: Freq Inc
- H_p0_is_2: P0 Is 2

- H_goldbach_sum: Goldbach Sum
- H_parity: Parity
- H_p0_even: P0 Even
- H_repr_count: Repr Count
- H_rc_nonneg: Rc Nonneg
- H_goldbach: Goldbach
- H_prime_gap: Prime Gap
- H_gap_pos: Gap Pos
- H_PrimeMode: Primemode
- H_freq: Freq
- H_weight: Weight
- H_mode_idx: Mode Idx
- H_freq_ge2: Freq Ge2
- H_weight_pos: Weight Pos
- H_response: Response
- H_total_energy: Total Energy
- H_te_pos: Te Pos
- H_sing_series: Sing Series
- H_ss_pos: Ss Pos
- H_twin_prime_const: Twin Prime Const
- H_c2_pos: C2 Pos
- H_major_arc: Major Arc
- H_log_sq: Log Sq
- H_ls_pos: Ls Pos
- H_minor_bound: Minor Bound
- H_minor_nonneg: Minor Nonneg
- H_repr_count: Repr Count
- H_goldbach_sum: Goldbach Sum
- H_grh_bound: Grh Bound
- H_gb_pos: Gb Pos
- H_grh_exponent: Grh Exponent
- H_grh_exp_half: Grh Exp Half
- H_nogrh_exp_lt1: Nogrh Exp Lt1

Established Facts

- F_decomposition: Decomposition
- F_main_is_grade0: Main Is Grade0
- F_error_is_higher: Error Is Higher
- F_goldbach_sum_def: Goldbach Sum Def
- F_gap_def: Gap Def
- F_response_at_zero: Response At Zero
- F_ss_lower: Ss Lower
- F_major: Major
- F_repr_decomp: Repr Decomp
- F_goldbach_sum: Goldbach Sum
- F_weight_log: Weight Log

4. Proof Architecture

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

File	Role
goldbach_latent_bridge_proof.py	
resonance_goldbach_proof.py	
circle_method_proof.py	

5. Discussion

References