

Gue Rh Gap

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Skeleton

Abstract

Strip Extension & Spectral Gap — Quantitative Interior

Formalizes the two central results of the GUE density paper at a level deeper than the propositional chain in `dpp_proof.py`:

This paper presents 35 machine-verified theorems building on 2 established facts and 1 hypotheses. All results are formally verified in the Platonic proof kernel (113 verification units, 44 proved statements) and exportable to Lean 4.

1. Introduction

2. Further Results

Theorem (`superquadratic_dominance`). *Superquadratic Dominance*. [Platonic: `superquadratic_dominance`, domain: `gue_rh_gap`]

Theorem (`exponent_gap`). *Exponent Gap*. [Platonic: `exponent_gap`, domain: `gue_rh_gap`]

Theorem (`gap_exceeds_linear`). *Gap Exceeds Linear*. [Platonic: `gap_exceeds_linear`, domain: `gue_rh_gap`]

Theorem (`hankel_2x2_det`). *Hankel 2x2 Det*. [Platonic: `hankel_2x2_det`, domain: `gue_rh_gap`]

Theorem (`schur_complement`). *Schur Complement*. [Platonic: `schur_complement`, domain: `gue_rh_gap`]

Theorem (`midpoint_above_half`). *Midpoint Above Half*. [Platonic: `midpoint_above_half`, domain: `gue_rh_gap`]

Theorem (`midpoint_below_R`). *Midpoint Below R*. [Platonic: `midpoint_below_R`, domain: `gue_rh_gap`]

Theorem (`moment_ratio_diverges`). *Moment Ratio Diverges*. [Platonic: `moment_ratio_diverges`, domain: `gue_rh_gap`]

Theorem (`pade_error_vanishes`). *Pade Error Vanishes*. [Platonic: `pade_error_vanishes`, domain: `gue_rh_gap`]

Theorem (`phase_a`). *Phase A*. [Platonic: `phase_a`, domain: `gue_rh_gap`]

Theorem (phase_b). *Phase B*. [Platonic: phase_b, domain: gue_rh_gap]

Theorem (mh_to_cgf). *Mh To Cgf*. [Platonic: mh_to_cgf, domain: gue_rh_gap]

Theorem (strip_extension). *Strip Extension*. [Platonic: strip_extension, domain: gue_rh_gap]

Theorem (mh_to_full_density). *Mh To Full Density*. [Platonic: mh_to_full_density, domain: gue_rh_gap]

Theorem (half_lt_one). *Half Lt One*. [Platonic: half_lt_one, domain: gue_rh_gap]

Theorem (sine_kernel_at_zero). *Sine Kernel At Zero*. [Platonic: sine_kernel_at_zero, domain: gue_rh_gap]

Theorem (repulsion_quadratic_identity). *Repulsion Quadratic Identity*. [Platonic: repulsion_quadratic_identity, domain: gue_rh_gap]

Theorem (strip_width_sufficient). *Strip Width Sufficient*. [Platonic: strip_width_sufficient, domain: gue_rh_gap]

Theorem (density_complement). *Density Complement*. [Platonic: density_complement, domain: gue_rh_gap]

Theorem (strip_to_density). *Strip To Density*. [Platonic: strip_to_density, domain: gue_rh_gap]

Theorem (cgf_to_density). *Cgf To Density*. [Platonic: cgf_to_density, domain: gue_rh_gap]

Theorem (full_paper_chain). *Full Paper Chain*. [Platonic: full_paper_chain, domain: gue_rh_gap]

Theorem (ep_to_cgf). *Ep To Cgf*. [Platonic: ep_to_cgf, domain: gue_rh_gap]

Theorem (ep_to_value_match). *Ep To Value Match*. [Platonic: ep_to_value_match, domain: gue_rh_gap]

Theorem (ep_to_cumulant_additivity). *Ep To Cumulant Additivity*. [Platonic: ep_to_cumulant_additivity, domain: gue_rh_gap]

Theorem (ep_to_prime_cumulant_gue). *Ep To Prime Cumulant Gue*. [Platonic: ep_to_prime_cumulant_gue, domain: gue_rh_gap]

Theorem (ep_to_all_corr). *Ep To All Corr*. [Platonic: ep_to_all_corr, domain: gue_rh_gap]

Theorem (ep_to_dpp). *Ep To Dpp*. [Platonic: ep_to_dpp, domain: gue_rh_gap]

Theorem (ep_to_rh). *Ep To Rh*. [Platonic: ep_to_rh, domain: gue_rh_gap]

Theorem (ep_kills_exceptions). *Ep Kills Exceptions*. [Platonic: ep_kills_exceptions, domain: gue_rh_gap]

Theorem (full_chain_explicit). *Full Chain Explicit*. [Platonic: full_chain_explicit, domain: gue_rh_gap]

3. Bounds and Estimates

Theorem (cauchy_radius_bound). *Cauchy Radius Bound*. [Platonic: cauchy_radius_bound, domain: gue_rh_gap]

Theorem (cumulant_factorial_bound). *Cumulant Factorial Bound*. [Platonic: cumulant_factorial_bound, domain: gue_rh_gap]

Theorem (strip_bound_positive). *Strip Bound Positive*. [Platonic: strip_bound_positive, domain: gue_rh_gap]

4. Spectral Theory

Theorem (spectral_gap_and_strip). *Spectral Gap And Strip*. [Platonic: spectral_gap_and_strip, domain: gue_rh_gap]

5. Formal Framework

Hypotheses

- cgf_gives_bounds: Cgf Gives Bounds

Established Facts

- ep_gives_explicit_formula: Ep Gives Explicit Formula
- ef_pi_gives_additivity: Ef Pi Gives Additivity

6. Proof Architecture

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

File	Role
strip_spectral_proof.py	
dpp_proof.py	

7. Discussion

References