

# Rmt Latent Bridge

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Skeleton

## Abstract

RMT–Latent Bridge: Grade-Shadow Duality.

This paper presents 16 machine-verified theorems building on 2 established facts and 16 hypotheses. All results are formally verified in the Platonic proof kernel (68 verification units, 16 proved statements) and exportable to Lean 4.

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## 1. Introduction

## 2. Further Results

**Theorem** (grade2\_dominates\_grade3). *Grade2 Dominates Grade3*. [Platonic: grade2\_dominates\_grade3, domain: rmt\_latent\_bridge]

**Theorem** (grade3\_ratio\_vanishes). *Grade3 Ratio Vanishes*. [Platonic: grade3\_ratio\_vanishes, domain: rmt\_latent\_bridge]

**Theorem** (higher\_grades\_negligible). *Higher Grades Negligible*. [Platonic: higher\_grades\_negligible, domain: rmt\_latent\_bridge]

**Theorem** (bilinear\_no\_energy\_creation). *Bilinear No Energy Creation*. [Platonic: bilinear\_no\_energy\_creation, domain: rmt\_latent\_bridge]

**Theorem** (bilinear\_only\_redistributes). *Bilinear Only Redistributes*. [Platonic: bilinear\_only\_redistributes, domain: rmt\_latent\_bridge]

**Theorem** (real\_symmetry\_gives\_goe). *Real Symmetry Gives Goe*. [Platonic: real\_symmetry\_gives\_goe, domain: rmt\_latent\_bridge]

**Theorem** (complex\_symmetry\_gives\_gue). *Complex Symmetry Gives Gue*. [Platonic: complex\_symmetry\_gives\_gue, domain: rmt\_latent\_bridge]

**Theorem** (symmetry\_determines\_repulsion). *Symmetry Determines Repulsion*. [Platonic: symmetry\_determines\_repulsion, domain: rmt\_latent\_bridge]

**Theorem** (grade1\_gives\_poisson). *Grade1 Gives Poisson*. [Platonic: grade1\_gives\_poisson, domain: rmt\_latent\_bridge]

**Theorem** (rho\_controls\_observability). *Rho Controls Observability*. [Platonic: rho\_controls\_observability, domain: rmt\_latent\_bridge]

**Theorem** (shadow\_predicts\_class). *Shadow Predicts Class.* [Platonic: shadow\_predicts\_class, domain: rmt\_latent\_bridge]

**Theorem** (non\_conservative\_grade2\_gives\_ginibre). *Non Conservative Grade2 Gives Ginibre.* [Platonic: non\_conservative\_grade2\_gives\_ginibre, domain: rmt\_latent\_bridge]

**Theorem** (conservative\_grade2\_gives\_wd). *Conservative Grade2 Gives Wd.* [Platonic: conservative\_grade2\_gives\_wd, domain: rmt\_latent\_bridge]

**Theorem** (wishart\_finite\_sample\_distortion). *Wishart Finite Sample Distortion.* [Platonic: wishart\_finite\_sample\_distortion, domain: rmt\_latent\_bridge]

### 3. Main Theorems

**Theorem** (grade\_shadow\_main). *Grade Shadow Main.* [Platonic: grade\_shadow\_main, domain: rmt\_latent\_bridge]

### 4. Convergence Results

**Theorem** (wishart\_population\_limit). *Wishart Population Limit.* [Platonic: wishart\_population\_limit, domain: rmt\_latent\_bridge]

### 5. Formal Framework

#### Hypotheses

- grade\_norm\_nonneg: Grade Norm Nonneg
- C0\_pos: C0 Pos
- rho\_pos: Rho Pos
- rho\_pow\_pos: Rho Pow Pos
- grade\_bound\_ax: Grade Bound Ax
- bilinear\_nonneg: Bilinear Nonneg
- energy\_nonneg: Energy Nonneg
- eps\_pos: Eps Pos
- tail3\_nonneg: Tail3 Nonneg
- log\_rho\_pos: Log Rho Pos
- log\_inv\_eps\_pos: Log Inv Eps Pos
- M\_pos: M Pos
- gamma\_nonneg: Gamma Nonneg
- mp\_distortion\_pos: Mp Distortion Pos
- W\_nonneg: W Nonneg
- N\_pos: N Pos

#### Established Facts

- rho\_pow: Rho Pow
- repulsion\_power: Repulsion Power

## 6. Proof Architecture

All proofs are implemented in the Platonic kernel (elysium/fields/rmt\_latent\_bridge/).

File	Role
rmt_latent_bridge_proof.py	

## 7. Discussion

## References