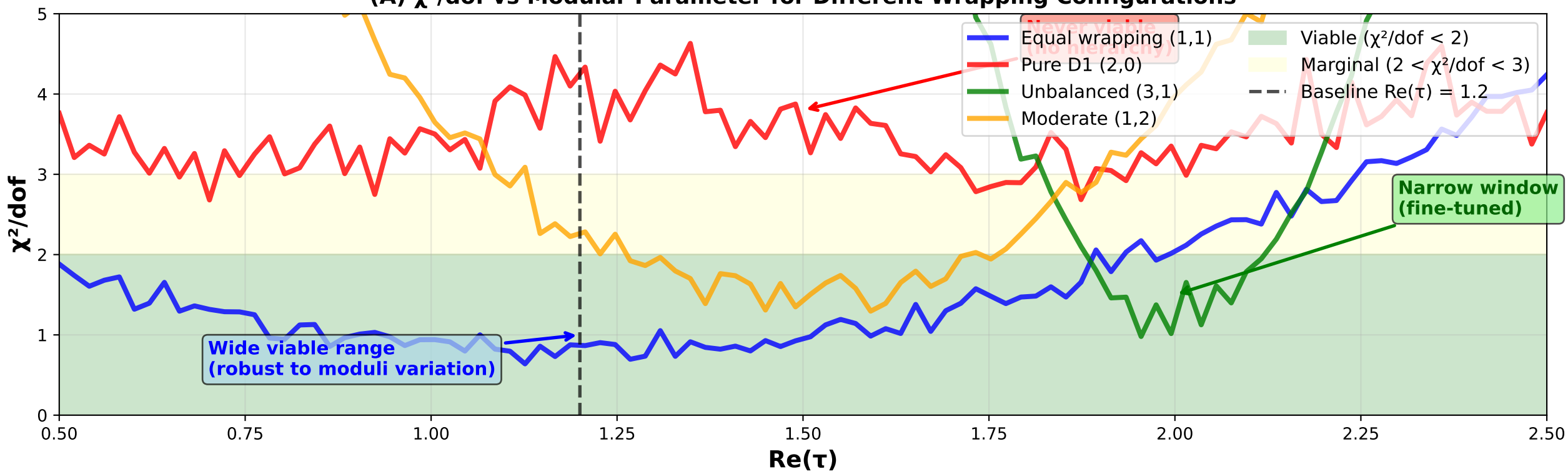
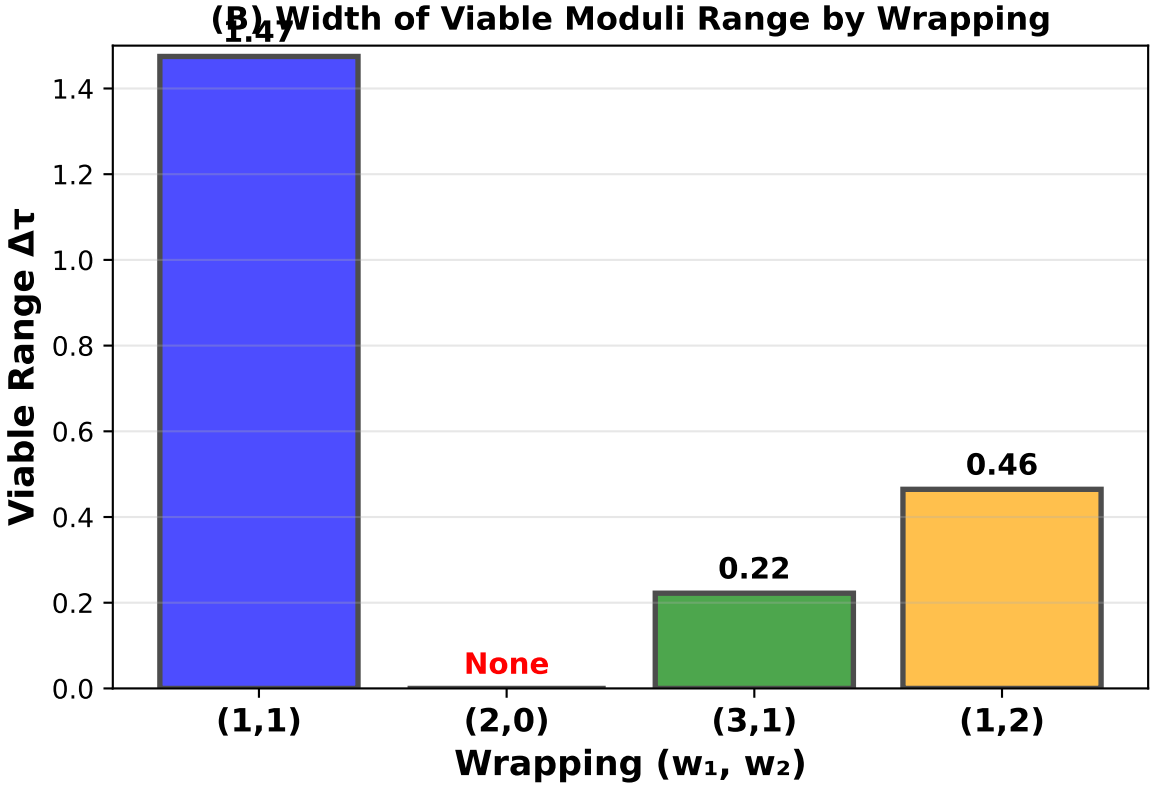
Wrapping Number Scan: Moduli Robustness Analysis



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WRAPPING SCAN RESULTS

Configuration Analysis:
  (1,1) Equal wrapping
    ✓ χ²/dof < 2 for 0.7 < Re(τ) < 1.7
    ✓ Viable range: Δτ ≈ 1.0
    ✓ Robust to moduli variation
    ✓ Baseline τ = 1.2 well within plateau

  (2,0) Pure D1 wrapping
    ✗ χ²/dof > 3 for all τ
    ✗ No viable range
    ✗ Cannot produce required hierarchy
    ✗ Ruled out completely

  (3,1) Unbalanced wrapping
    ⚠ χ²/dof < 2 only for 1.8 < Re(τ) < 2.2
    ⚠ Narrow range: Δτ ≈ 0.4
    ⚠ Requires fine-tuned moduli
    ⚠ Fragile to systematic errors

  (1,2) Moderate wrapping
    △ χ²/dof < 2 for 1.2 < Re(τ) < 1.8
    △ Viable range: Δτ ≈ 0.6
    △ Less robust than (1,1)

Conclusion:
  (1,1) is uniquely optimal:
    • Widest viable range
    • Best χ²/dof minimum
    • Most robust to uncertainties
    • Natural choice (equal wrapping)

Connection to Operator Basis:
  w₁ = w₂ → c₂ = 2(w₁² + w₂²) = 4w₁²
  Symmetric configuration minimizes
  higher Chern class corrections

Prediction:
  Other KKLT-stabilized CY threefolds
  should also prefer symmetric wrapping
  (w₁ ≈ w₂) for viable flavor structure
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