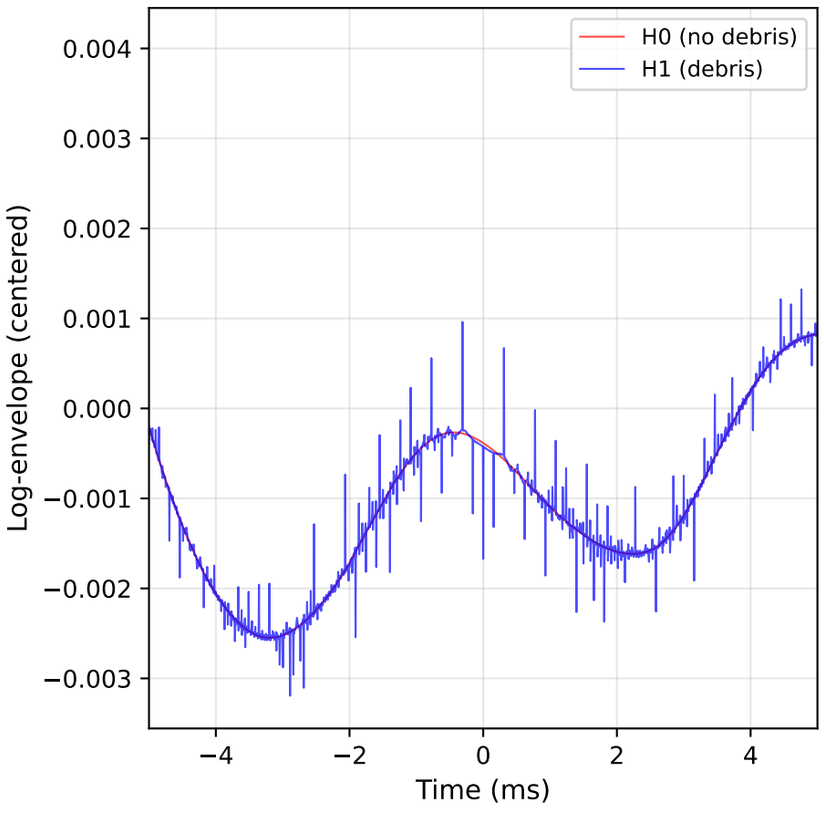

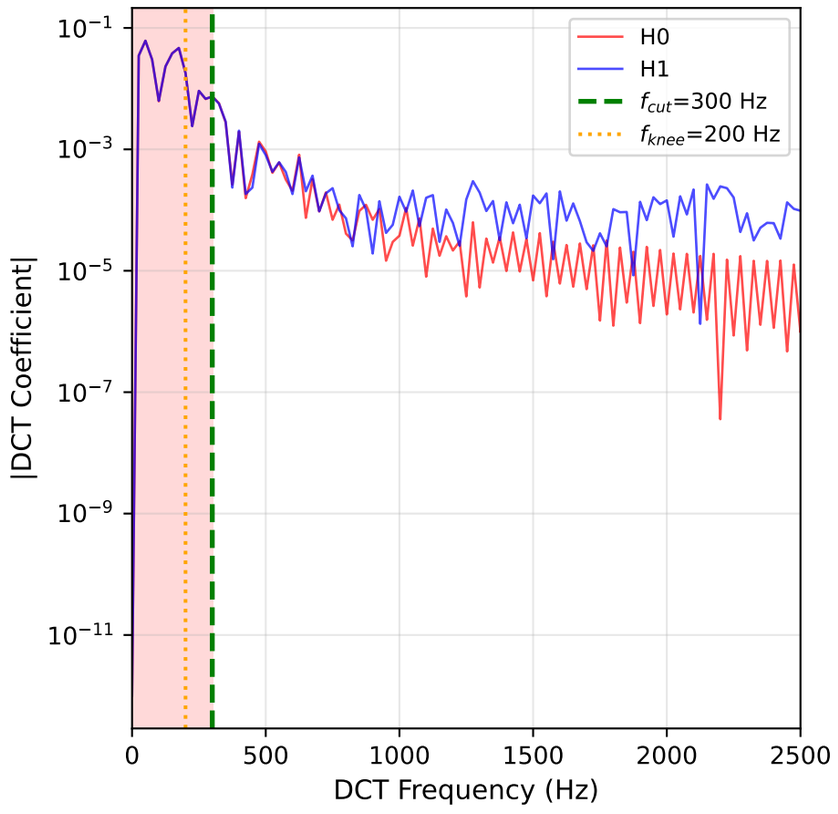

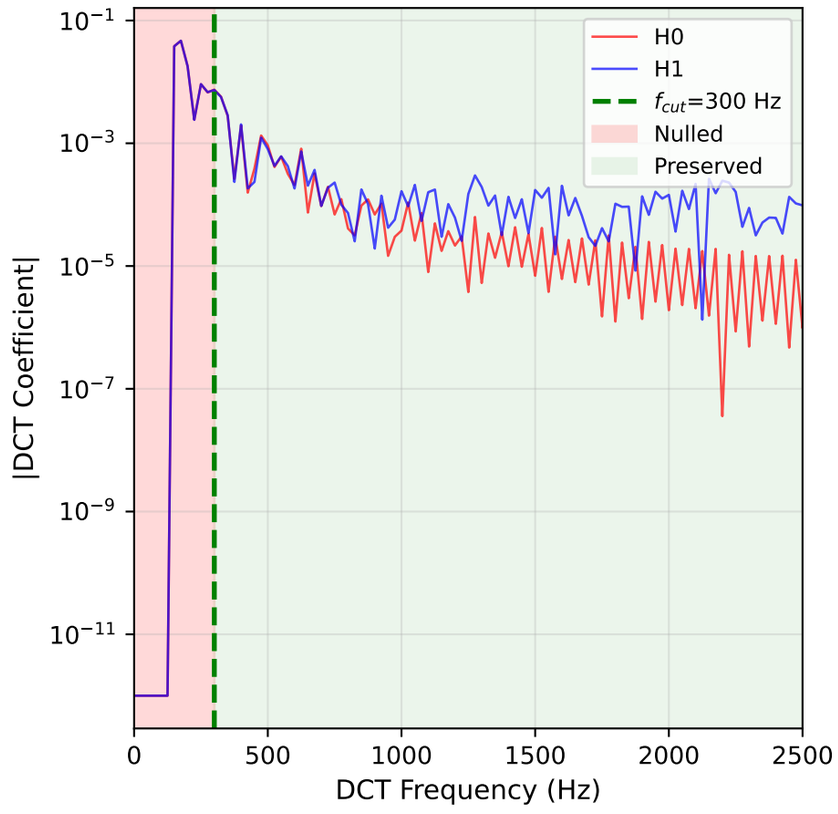

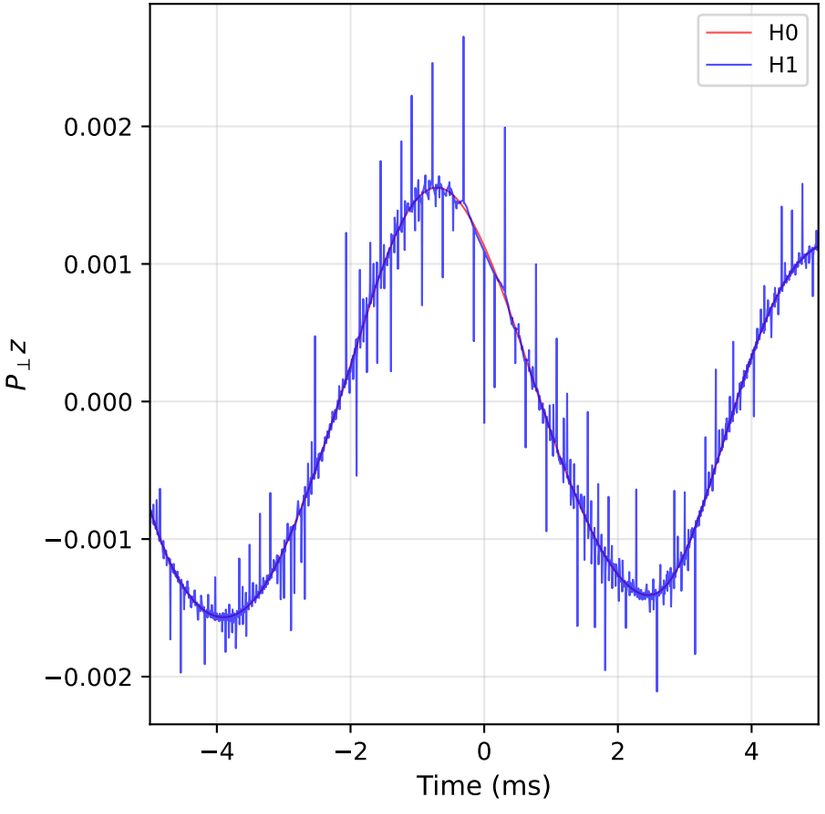

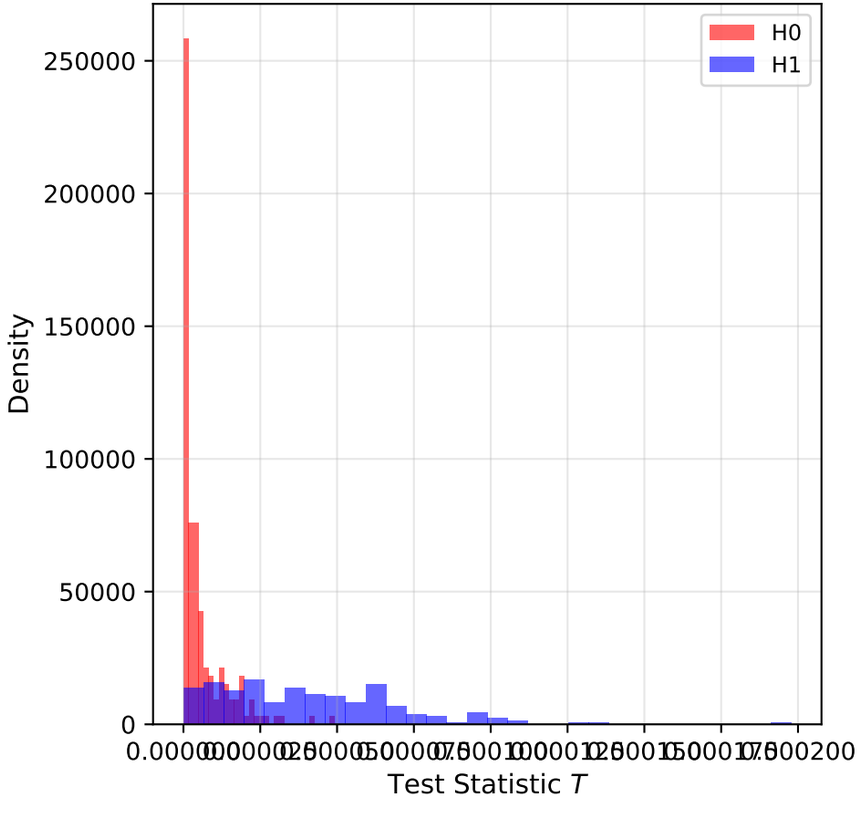

(f) Design Summary

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SURVIVAL SPACE DESIGN (CORRECTED)

Physical Parameters:
  - Fresnel radius: r_F = 4.47 m
  - Crossing time: T_cross = 0.60 ms
  - Signal bandwidth: f_max = 1677 Hz

Projection Operator P_perp:
  - Nulls DCT coefficients for f < f_cut
  - Preserved subspace: [f_cut, f_s/2]
  - Signal energy concentrates in [0, f_max]

Design Choice: f_cut = 300 Hz
  - Condition: f_knee < f_cut << f_max
  - f_cut/f_knee = 1.5 (noise margin)
  - f_cut/f_max = 0.18 (signal margin)

Key Metrics (at f_cut = 300 Hz):
  - Signal energy retention: eta_z > 99%
  - Noise energy removed: ~75-85%

Working Range:
  - Requires f_knee < f_max/3 ~ 560 Hz
```