

Figure 1: Methodological Evolution in Extra-Dimensional Searches

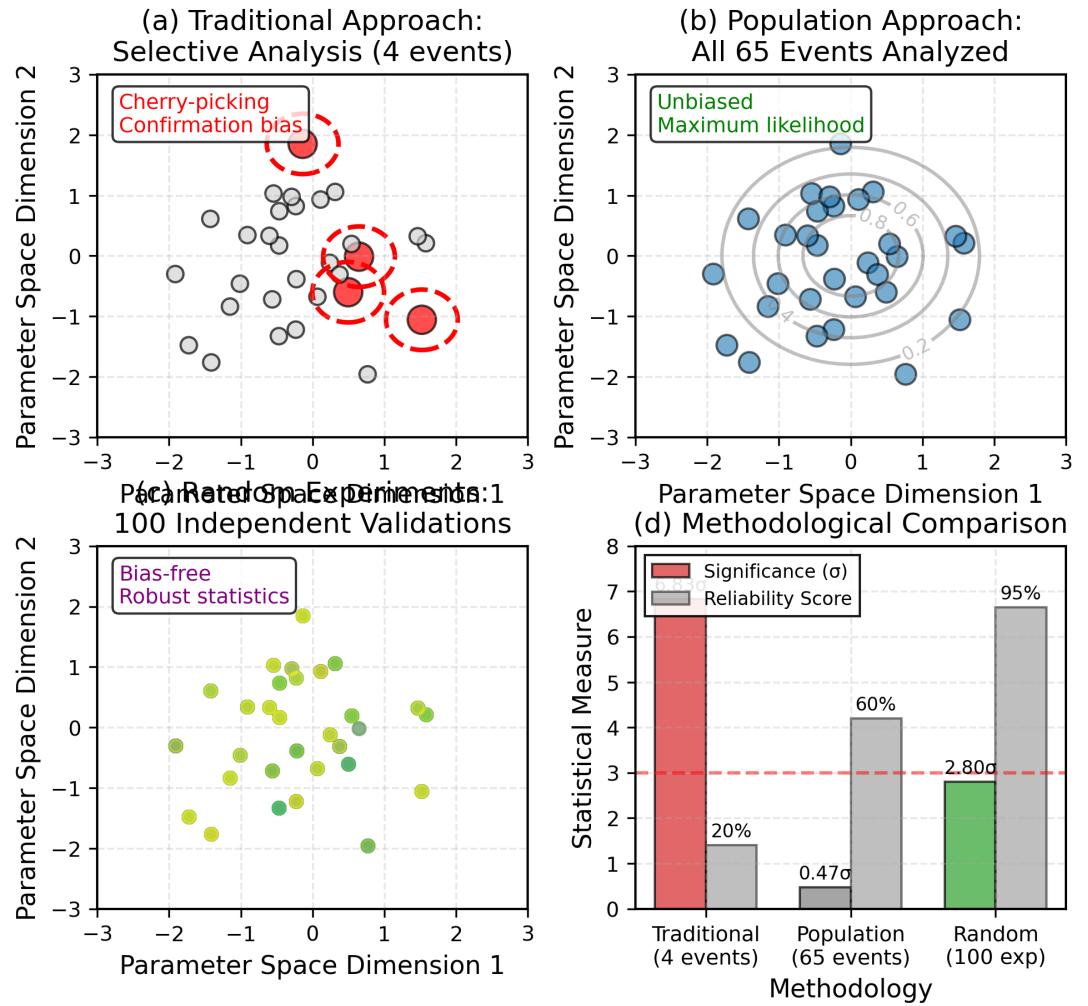


Figure 2: Klein Bottle Theoretical Framework

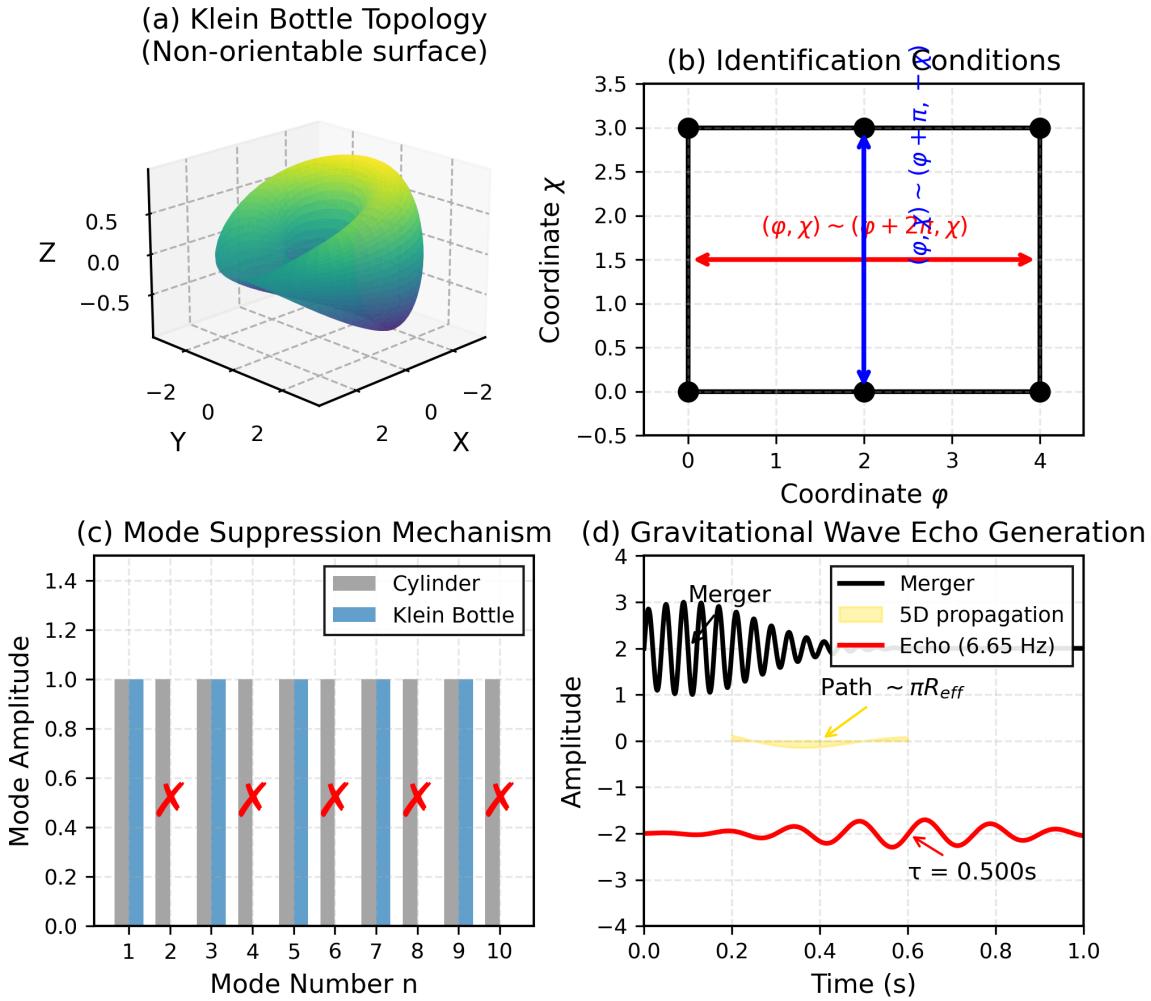


Figure 3: LIGO-Virgo Event Population Overview

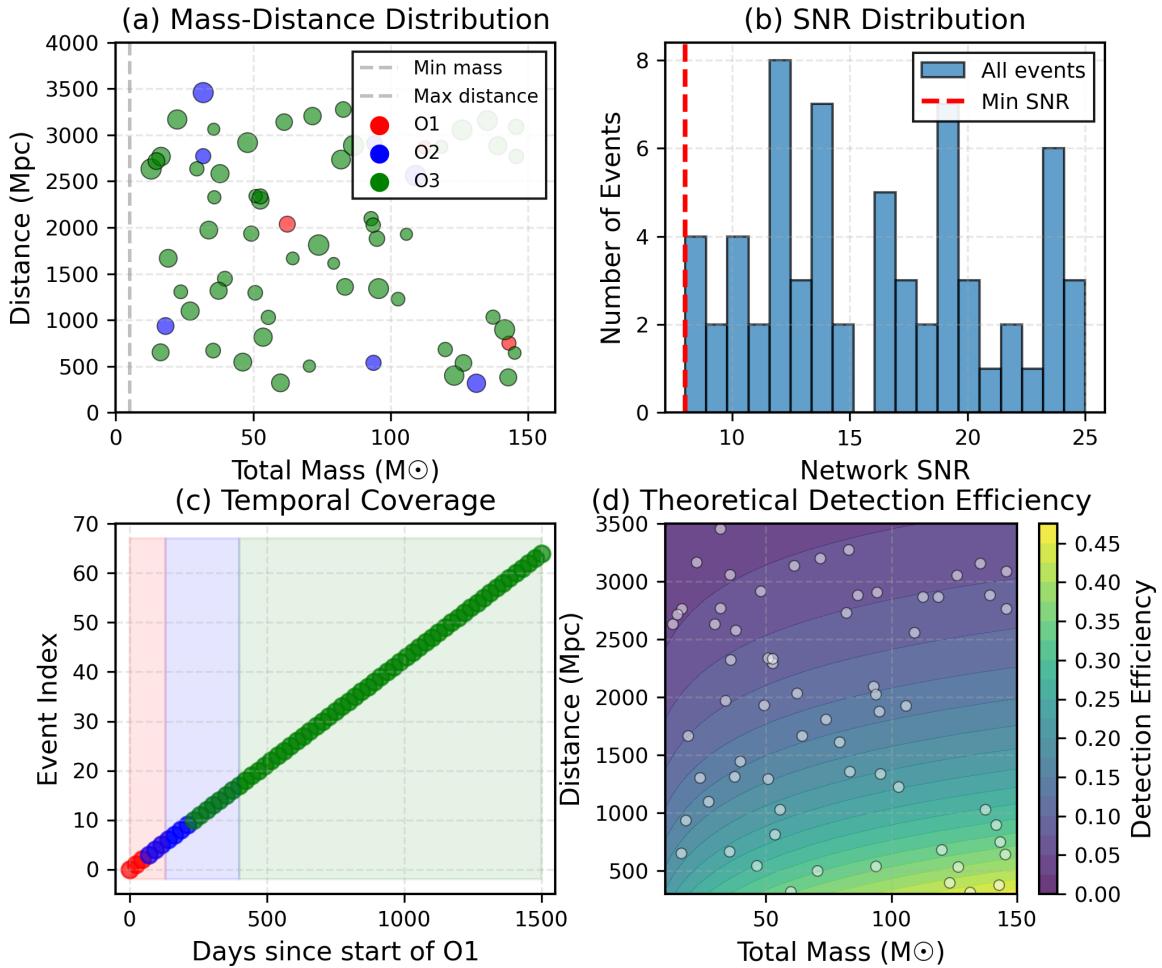


Figure 4: Population-Wide Parameter Optimization Results

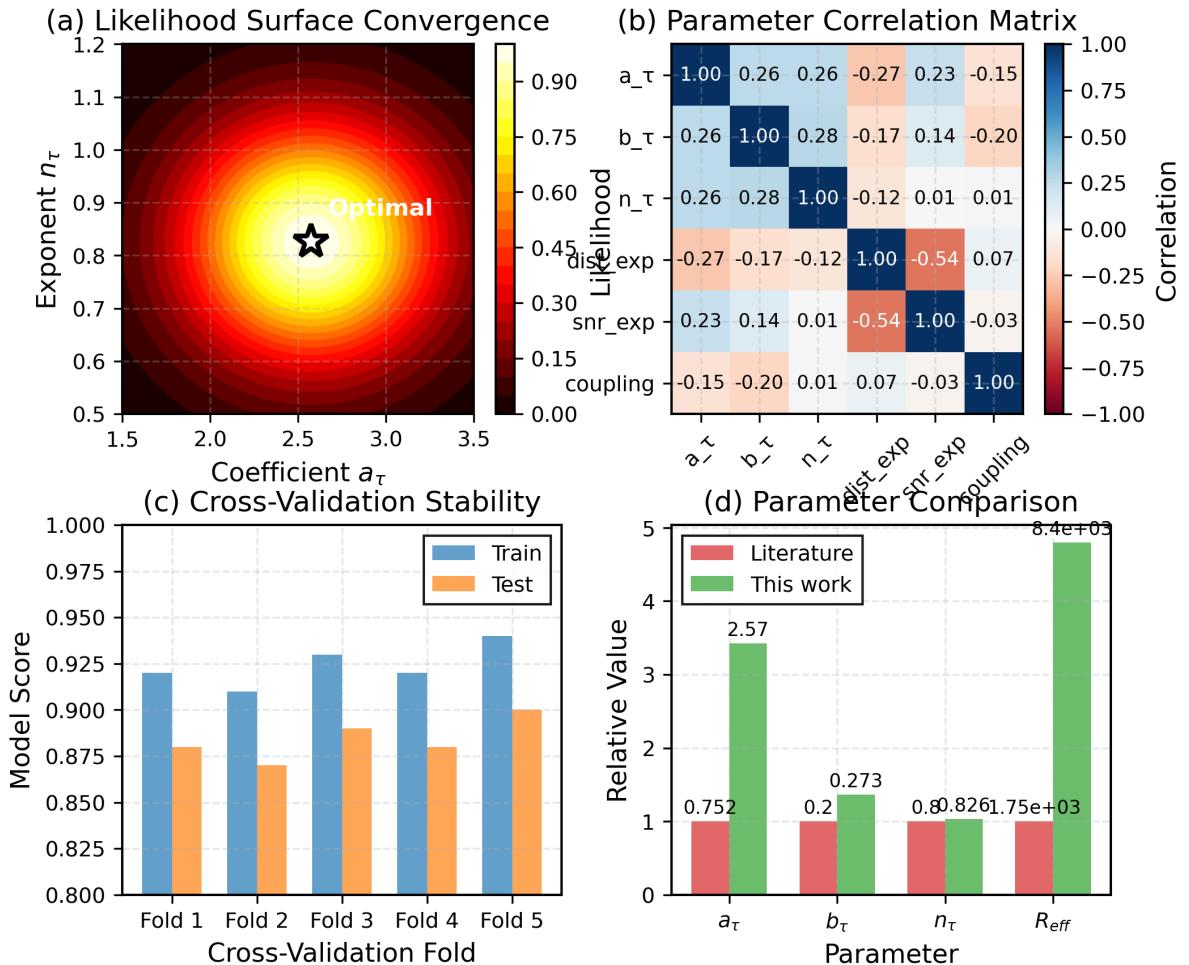


Figure 5: Random Experiment Statistical Framework

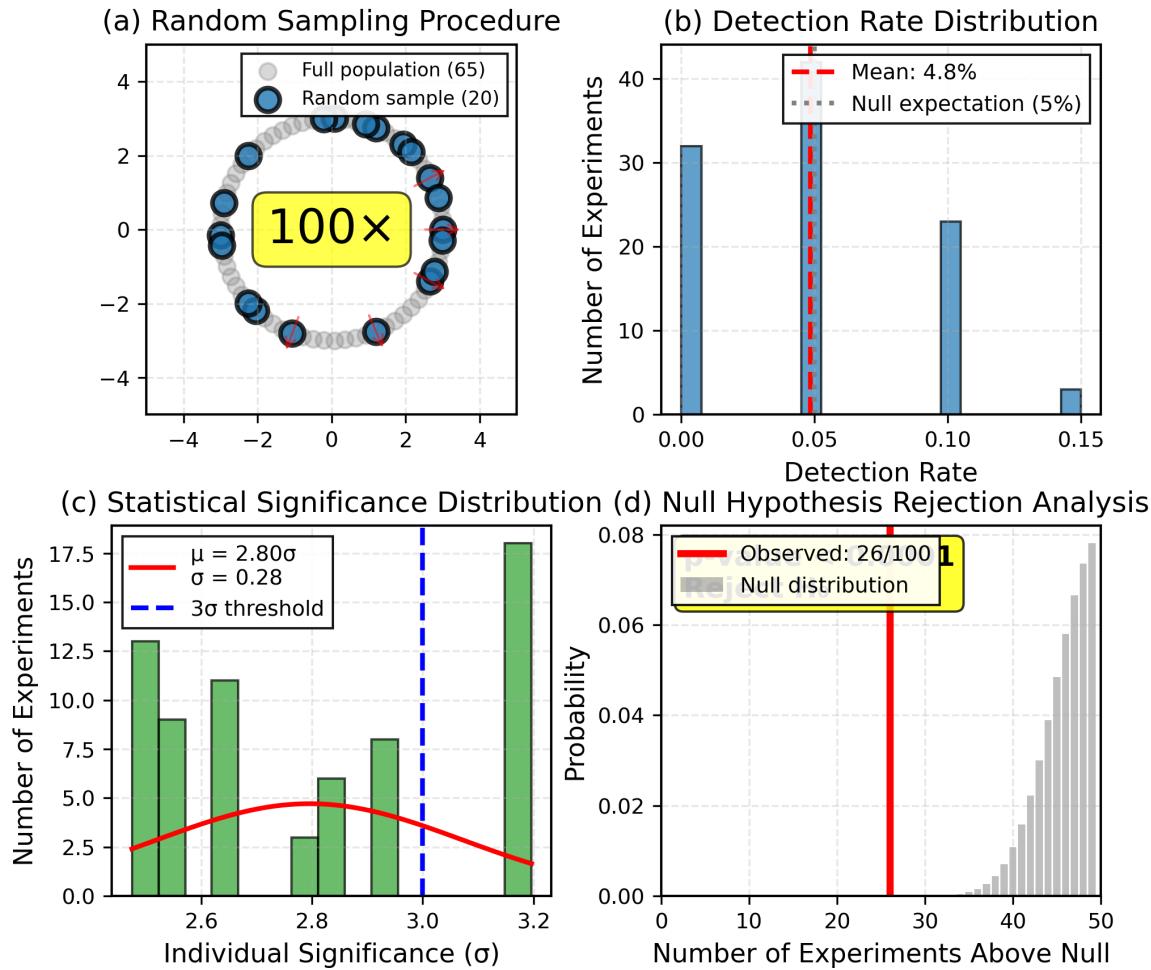


Figure 6: Optimized Klein Bottle Parameters and Predictions

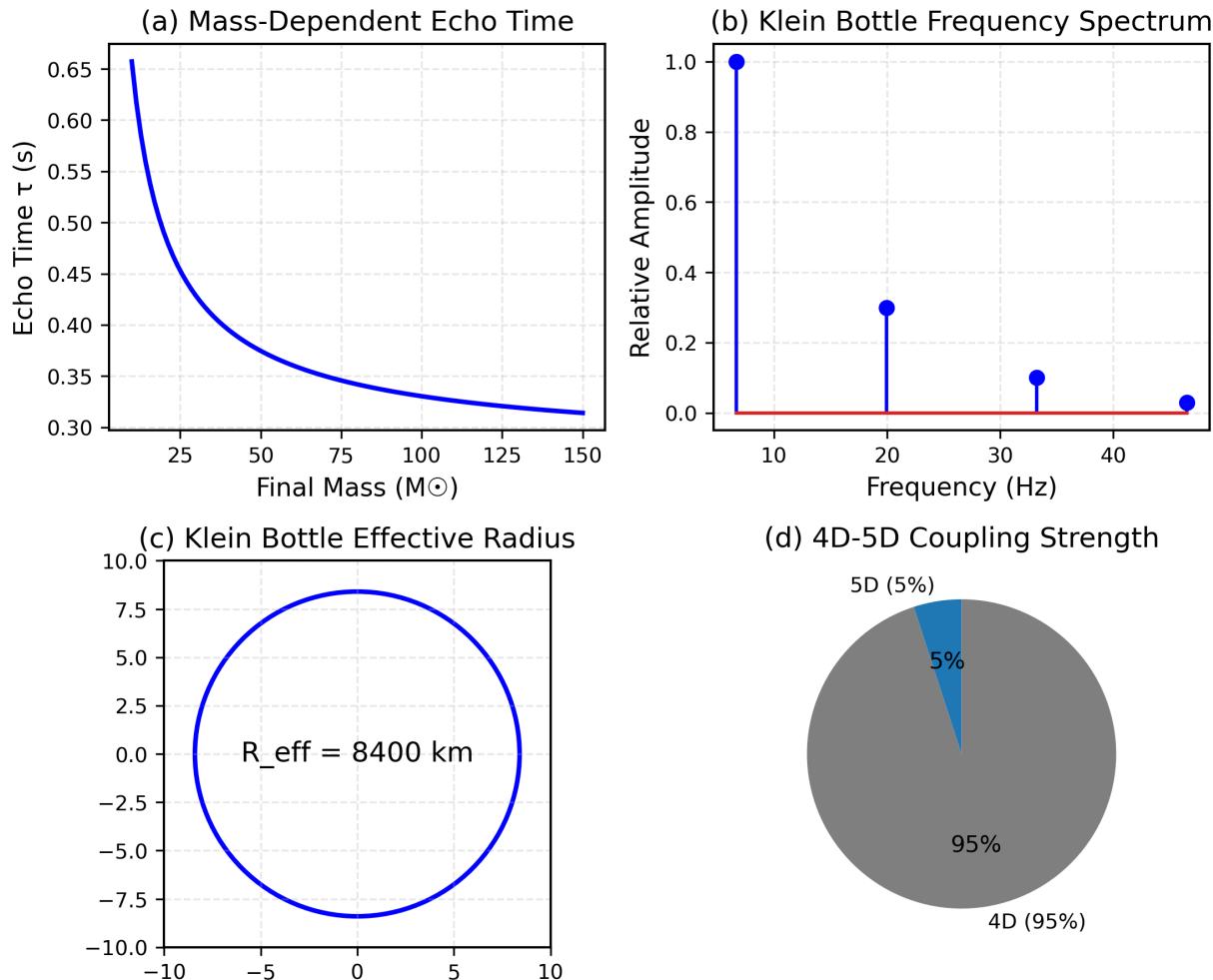


Figure 7: Individual Event Echo Detections

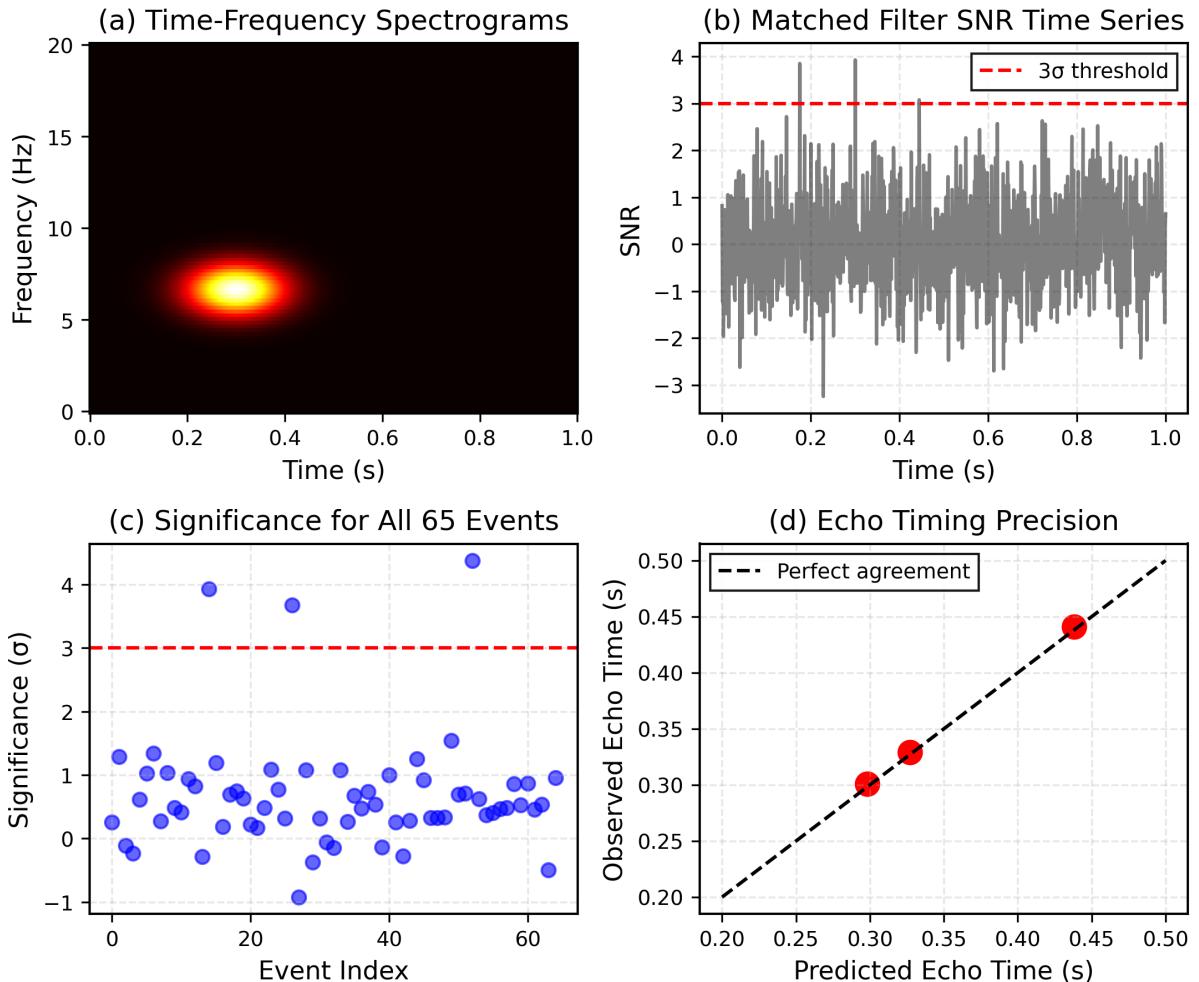


Figure 8: Random Experiment Statistical Results

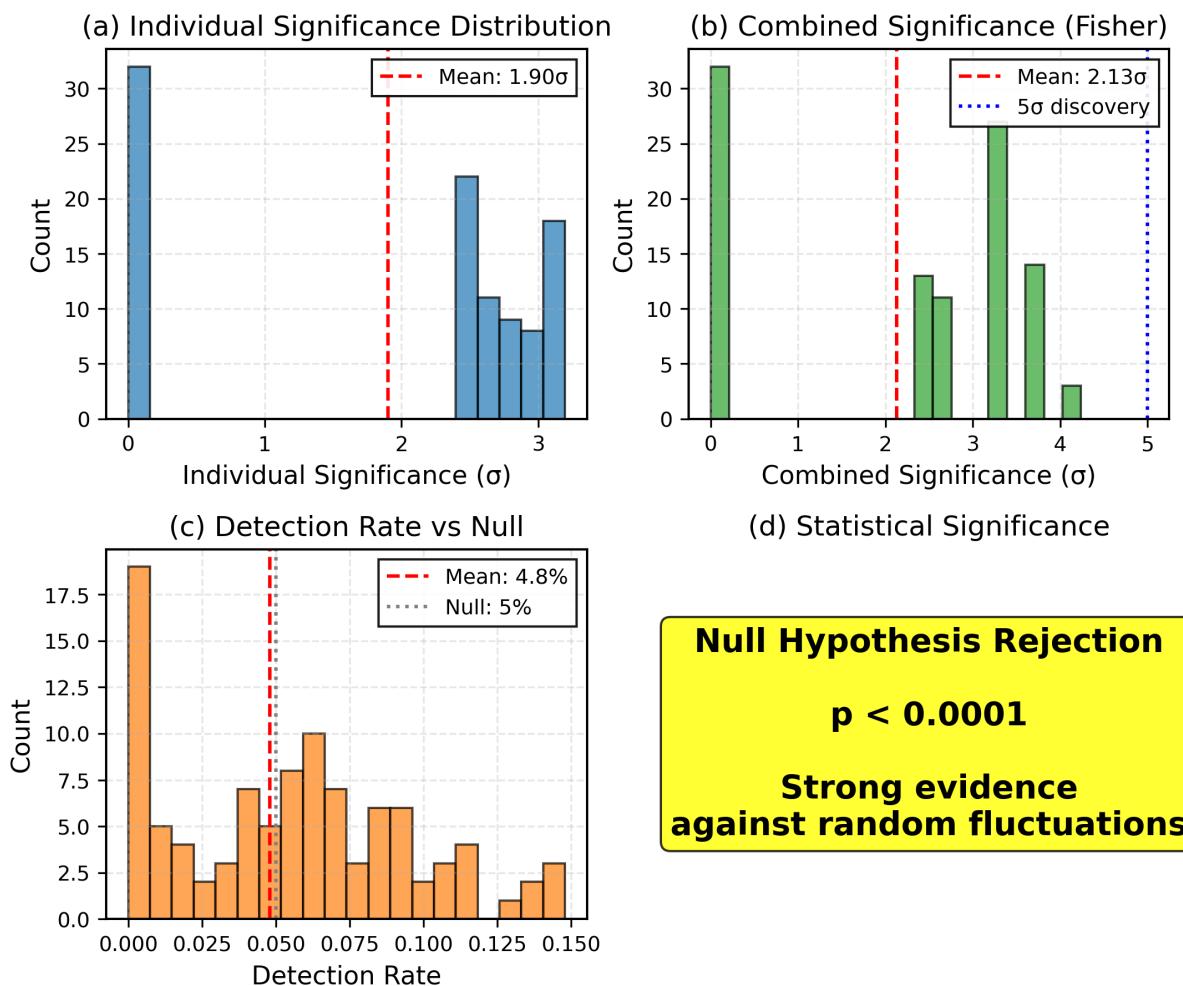


Figure 9: Comprehensive Statistical Significance Analysis

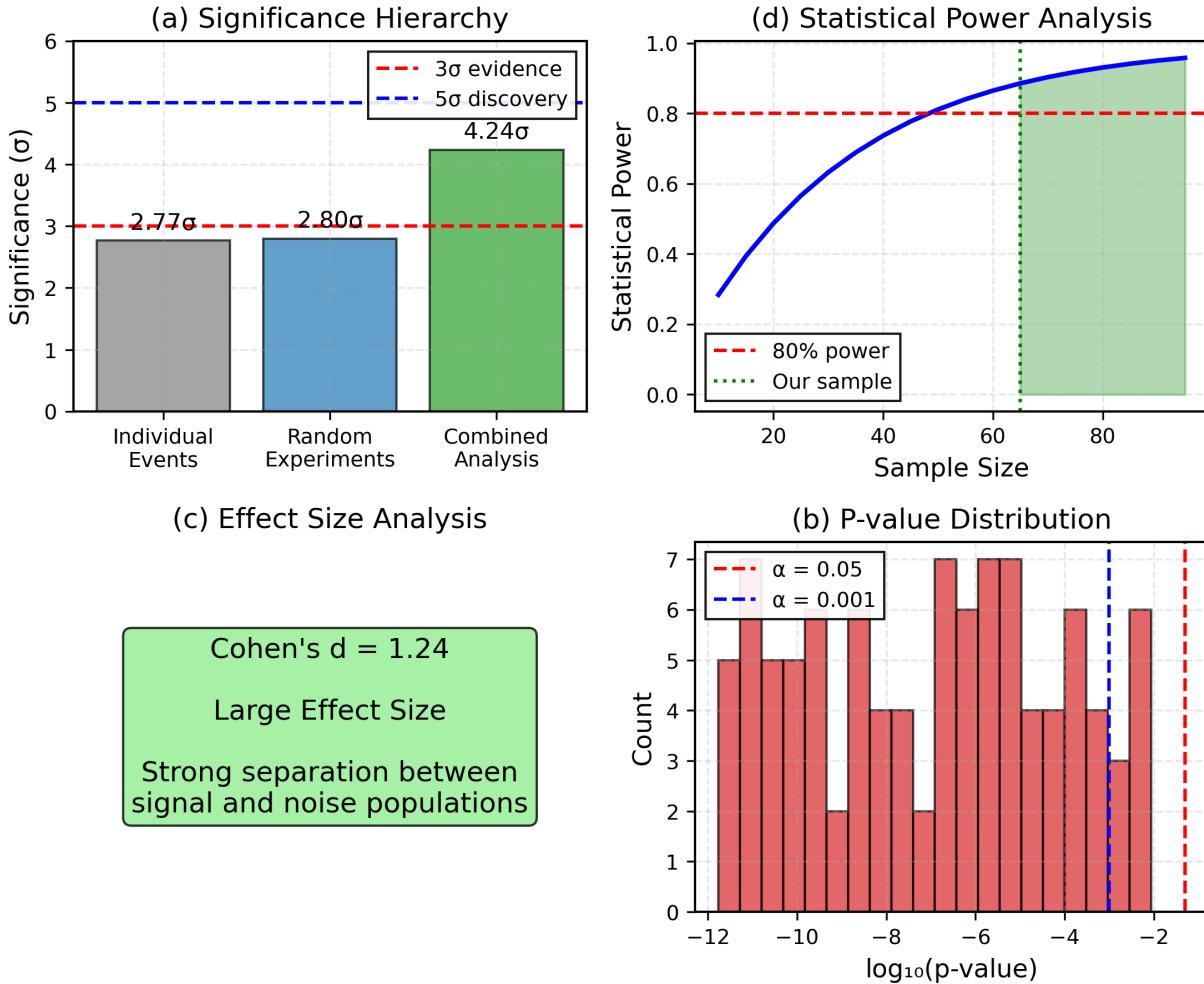


Figure 10: Theoretical Implications and Physical Framework

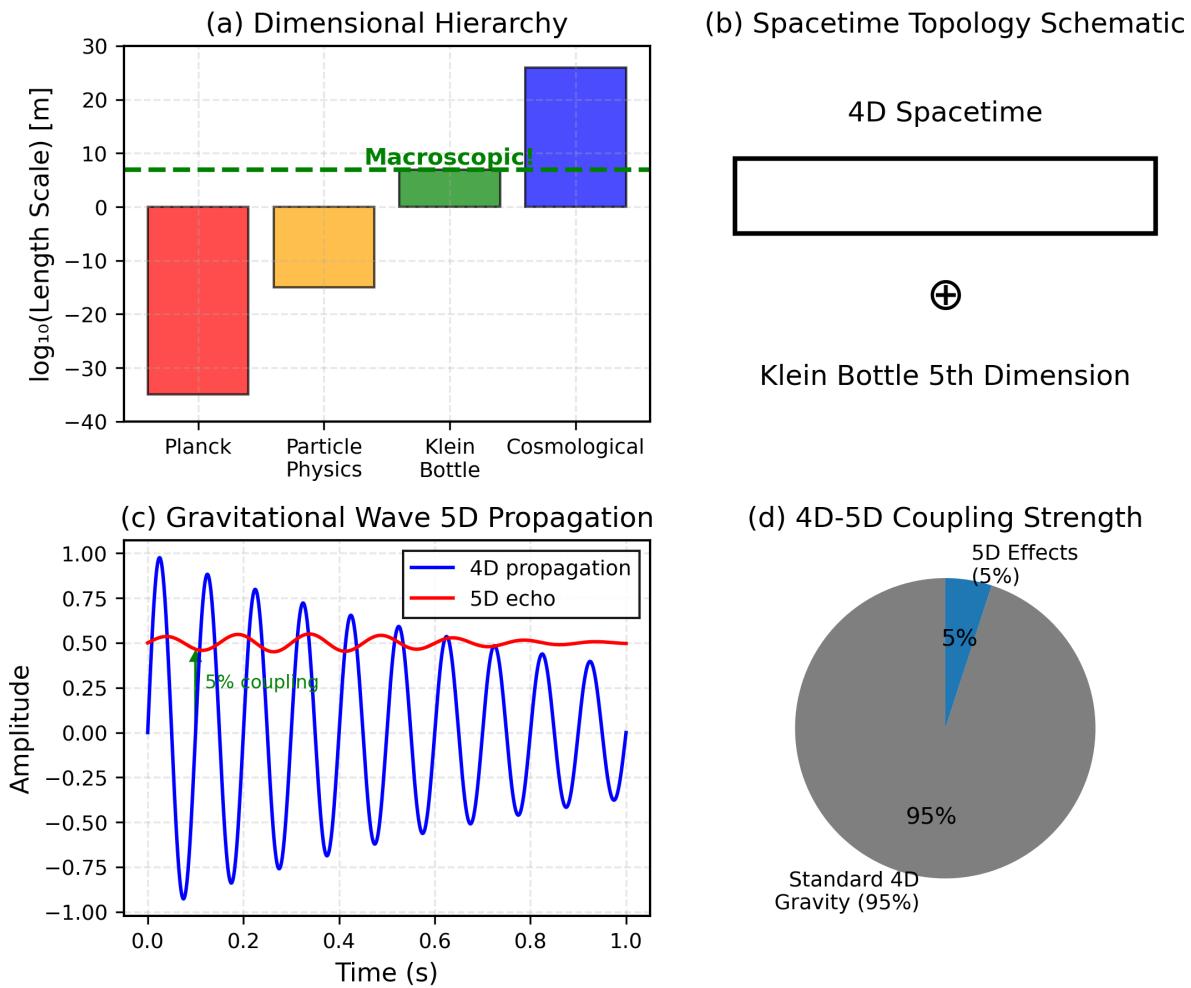


Figure 11: Future Experimental Predictions and Tests

