Parameter Optimization Report: Emergent Gravity from Quantum Collapse

# Best Configuration

Best parameters found:  
 collapse\_rate: 0.3977  
 collapse\_sigma: 0.1796  
 collapse\_amplitude: 0.6374  
 continuous\_noise\_amplitude: 0.0056  
 density\_decay: 0.9591  
 relativistic\_factor: 0.0036  
Estimated noise exponent: -4.064  
Fitness: -0.9358

# Optimization Process

The optimization algorithm ran for multiple iterations, sampling various combinations of collapse parameters. The fitness function was defined as the negative absolute difference between the computed noise exponent and -5 (i.e., -|slope + 5|). Parameter ranges were refined iteratively around the best-performing configurations. A steep noise spectrum (slope near -5) indicates strong suppression of small-scale fluctuations, suggesting an emergent, coherent gravitational field. The following configurations (with their corresponding noise exponents) were found to be the most promising:  
{'collapse\_rate': 0.3976535745160124, 'collapse\_sigma': 0.17961447084959895, 'collapse\_amplitude': 0.6374011717803811, 'continuous\_noise\_amplitude': 0.005571731360444329, 'density\_decay': 0.9590824120072107, 'relativistic\_factor': 0.0035797904046418754} -> slope: -4.06421113185537

# Next Steps

1) Run higher-resolution simulations with the optimized parameters.  
2) Validate the robustness of the noise exponent with longer simulation times.  
3) Compare the emergent noise spectrum with experimental data from short-range gravity tests.  
4) Extend the model to 3D and incorporate further relativistic corrections.