# Banana Collider: G-Field Stretch Modeling Math

# Goal: Construct mathematical backing for wave-stretched mass near black hole event horizon (G-field distortion)

# Key Concept: Spacetime stretching leads to waveform mass propagation

import numpy as np

import matplotlib.pyplot as plt

# Constants

G = 6.67430e-11 # Gravitational constant

c = 3.0e8 # Speed of light

# Black hole parameters (Schwarzschild radius)

def schwarzschild\_radius(mass):

return 2 \* G \* mass / c\*\*2

# Simulated wave propagation under G-field distortion

def gfield\_wave\_stretch(t, r0, frequency=1.0):

# G-field modeled as exponential tension stretching as you approach R\_s

wave = np.sin(2 \* np.pi \* frequency \* t) \* np.exp(-r0 / schwarzschild\_radius(1e31))

return wave

# Simulation

mass\_bh = 1e31 # Example black hole mass (kg)

r0 = np.linspace(1e3, schwarzschild\_radius(mass\_bh), 1000) # radial distance vector

t = np.linspace(0, 1, 1000)

# Plot wave at different distances

plt.figure(figsize=(10, 6))

for i in [100, 300, 700, 900]:

wave = gfield\_wave\_stretch(t, r0[i])

plt.plot(t, wave, label=f"r0={int(r0[i]):.0e}m")

plt.title("G-Field-Induced Waveform Distortion Near Event Horizon")

plt.xlabel("Time (s)")

plt.ylabel("Amplitude")

plt.legend()

plt.grid(True)

plt.tight\_layout()

plt.savefig("gfield\_wave\_distortion.png")

plt.show()