import numpy as np

import matplotlib.pyplot as plt

C = np.linspace(0, 1, 100)

S = 2.828 \* (1 - C) + 2 \* C

plt.plot(C, S, label="Bell S (MBT)")

plt.axhline(2, color='gray', linestyle='--', label='Classical Limit')

plt.axhline(2.828, color='purple', linestyle='--', label='Quantum Limit')

plt.xlabel("Collapse (C) / Entropy")

plt.ylabel("Bell S (Order Parameter)")

plt.title("Emergence of Quantum Order (MBT: S vs. Collapse)")

plt.legend()

plt.show()