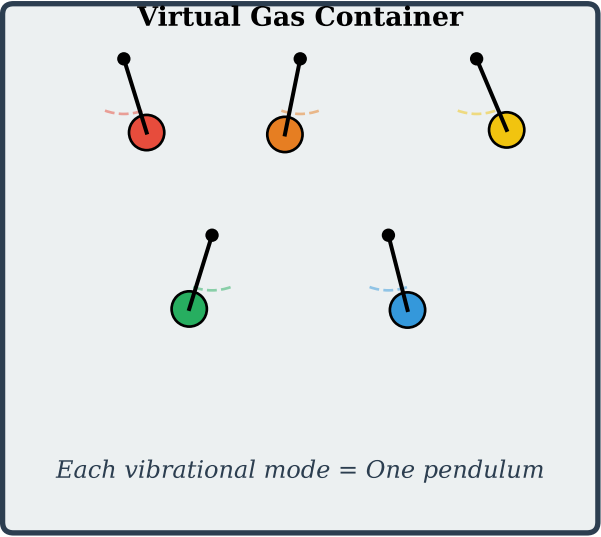
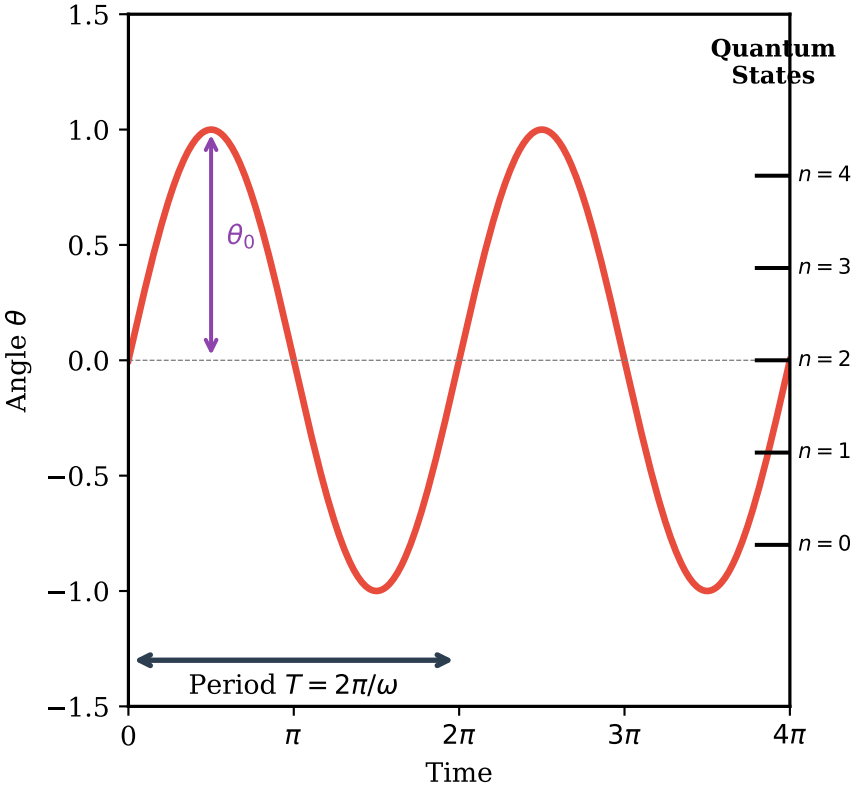


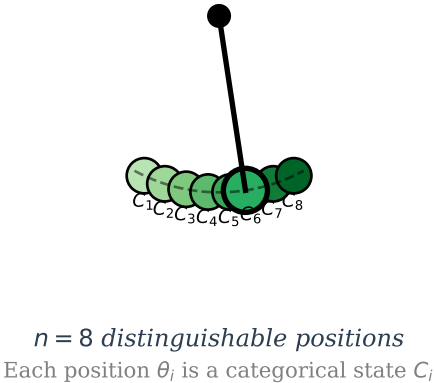
(A) Virtual Gas Molecules as Pendulums



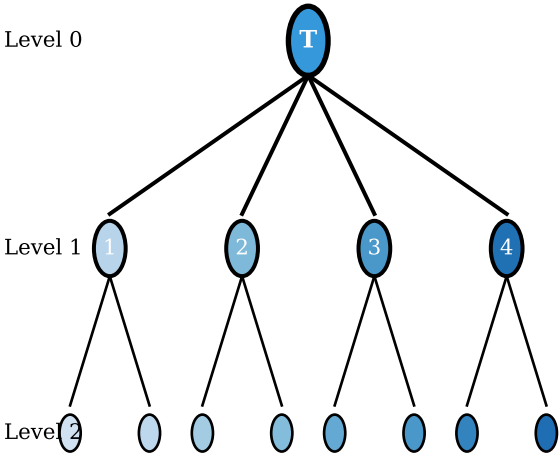
(B) Oscillatory Perspective



(C) Categorical Perspective



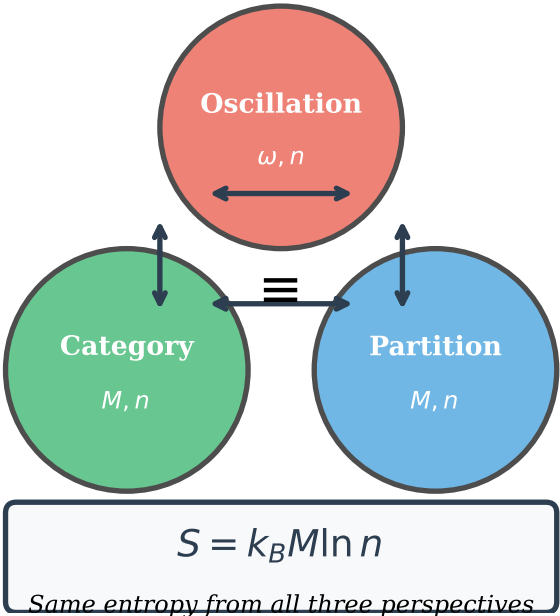
(D) Partition Perspective



Partition tree: depth M , branching n

Leaves = n^M terminal states

(E) The Fundamental Equivalence



(F) Parameter Correspondence

Concept	Oscillatory	Categorical	Partition
DOF (M)	Modes	Dimensions	Levels
States (n)	Quantum #	Levels	Branches
Total	n^M states	$ C $	Leaves
Entropy	$k_B \ln W$	$k_B \ln C $	$k_B M \ln n$

The pendulum demonstrates all three:

Oscillation: $\theta(t) = \theta_0 \cos(\omega t)$

Category: n distinguishable positions $\{C_1, \dots, C_n\}$

Partition: Period T divided into n intervals

All yield: $S = k_B \ln n$