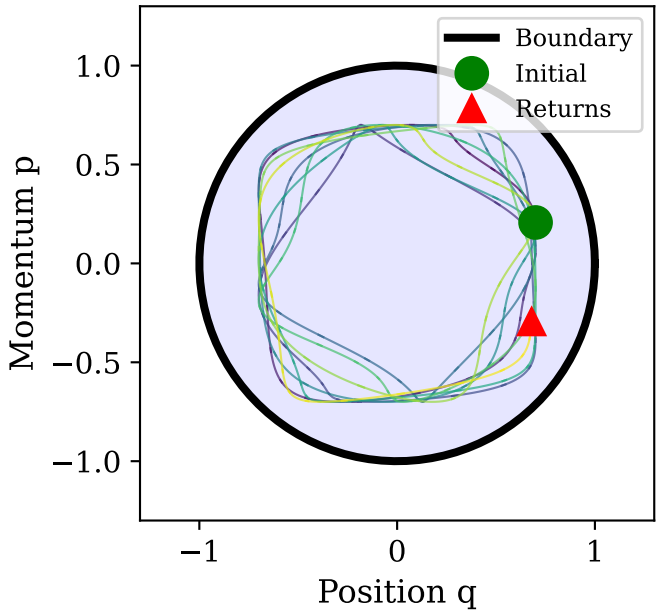
Figure 1: Poincaré Recurrence → Oscillation Necessity

A. Bounded Phase Space (Finite Volume)



B. The Recurrence Theorem

POINCARÉ RECURRENCE THEOREM

Given:
- Bounded phase space M
- Measure-preserving dynamics φ_t
- Finite measure $\mu(M) < \infty$

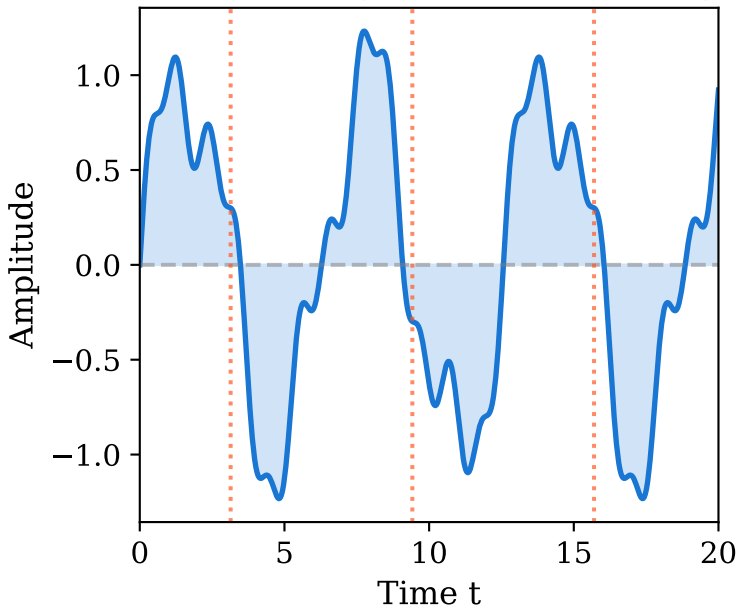
Then:
Almost every trajectory returns arbitrarily close to its origin:

$$\liminf_{t\to\infty} d(\varphi_t(x), x) = 0$$

C. Only Oscillatory Satisfies All

Oscillatory	VALID (returns)
Chaotic	Destroys consistency
Monotonic	Escapes boundary
Static	No dynamics (no recurrence)

D. Oscillatory Returns to Origin



E. The Logical Implication

Bounded Phase Space + Consistency → **IMPLIES** → **Oscillatory Dynamics (Unique Mode)**

F. Why Reality Oscillates

Physical Consequences

- Energy quantization: $E = \hbar\omega$
- Wave-like behaviour
- Periodic phenomena
- Recurrent states
- Time-reversal symmetry

Reality MUST oscillate (no other option)