

## Section 5. Parallel Does Not Mean Many-Worlds Quantum Mechanics

This section distinguishes the CUWF conception of parallel universes from the Many-Worlds Interpretation (MWI) of quantum mechanics. Although both frameworks acknowledge multiplicity, they do so at fundamentally different ontological levels. MWI treats multiplicity as the literal realization of all quantum outcomes in a universally branching wavefunction. CUWF, by contrast, treats parallel universes as collapse-separated domains of one universal wave substrate whose accessibility structures have become permanently disconnected. The difference is therefore not terminological, but structural. What MWI interprets as world-duplication, CUWF reinterprets as accessibility fracture.

### 5.1 Ontological Inconsistency of the Many-Worlds Interpretation

Within the Many-Worlds Interpretation, the universal wavefunction evolves unitarily at all times, and every measurement interaction is taken to realize all possible outcomes as distinct branches of reality. The apparent definiteness of experience is then explained by branch-relative observer states rather than by any genuine collapse. CUWF rejects this ontology not because it recognizes multiplicity, but because it locates multiplicity in the wrong structural object.

First, MWI multiplies complete histories without a corresponding conservation principle. If every microscopic interaction produces further branching, then the theory commits itself to an unbounded proliferation of fully realized macroscopic worlds. Yet it does not identify any conserved structural quantity that governs or constrains this multiplication. The result is not merely abundance, but ontological inflation.

Second, MWI lacks a physical criterion for experiential uniqueness. If all outcomes are equally real within one total wavefunction, the theory does not explain why an observer experiences one determinate outcome rather than all outcomes at once. To say that the observer simply becomes

branch-relative is to redescribe the problem, not to solve it. The crucial question remains: what physically confines experience to one outcome-domain rather than another?

Third, MWI does not adequately ground irreversibility at the ontological level. Because all branches remain part of one globally unitary structure, the impossibility of re-merging macroscopic histories is not built into the theory's basic architecture. At most, irreversibility is attributed to practical decoherence, environmental complexity, or observational limitation. CUWF regards this as insufficient. What is needed is not merely effective non-interference, but a structural criterion specifying when alternative outcomes cease to belong to the same accessible reality.

## 5.2 The CUWF Correction: Accessibility Collapse

CUWF replaces world-duplication with accessibility collapse. The universal wave field remains single throughout. What changes during branching is not the number of substrates, but the topology of the accessibility structure internal to that substrate. Collapse does not create additional universes ex nihilo; it removes admissible relational paths between emerging outcome-domains.

In CUWF terms, a measurement interaction modifies the entropic accessibility operator  $\Xi_E$ . When the deformation of  $\Xi_E$  across a collapse surface exceeds the connectivity threshold  $\Lambda_c$ , the accessibility graph fractures into disconnected closure components. At that point, the relevant outcomes no longer belong to one recoverably accessible domain. They become mutually unreachable and therefore qualify as parallel domains in the strict CUWF sense.

This shift resolves the core difficulties of MWI at the level of ontology. Ontological inflation is avoided because no new foundational realities are produced. Experiential uniqueness is explained because observers are confined to one closure component of the fractured accessibility graph. Irreversibility is structural rather than phenomenological: once admissible closure-preserving bridges are removed, the disconnected components cannot be rejoined without violating the very constraints that stabilize them as domains.

### 5.3 Structural Comparison Between MWI and CUWF

Aspect	MWI	CUWF
World generation	Literal duplication of spacetime histories	No duplication; accessibility graph partitions
Status of the wavefunction	Globally real and fully unitary	Single substrate; collapse reshapes accessibility
Reason for branching	Quantum superposition at measurement	Entropic accessibility divergence beyond $\Lambda_c$
Irreversibility	Emergent or only effectively explained	Structural; enforced by graph disconnection
Existence criterion	Mathematical possibility	Accessibility within closure

### 5.4 Why CUWF Resolves the Three Core Failures of MWI

The three central failures of the Many-Worlds Interpretation—ontological inflation, lack of experiential uniqueness, and the absence of structural irreversibility—are not peripheral weaknesses. They follow directly from the assumption that the wavefunction alone exhausts physical ontology. CUWF departs from that assumption by assigning ontological significance not only to the universal wave substrate, but also to the accessibility topology through which collapse-defined reality is structured.

First, CUWF preserves ontological economy without requiring spacetime multiplication. Branching is not interpreted as the production of new worlds, but as the redistribution and severing of admissible relational channels within one still-wave substrate. What is conserved is not a count of worlds, but the underlying reality in which closure relations are reorganized. No hidden conservation law is violated because nothing ontologically new is created at the substrate level.

Second, CUWF grounds experiential uniqueness in closure confinement. Observers are not diffuse entities spread across all possible outcomes of a global superposition. They are embedded in one accessibility component of the collapse-structured field. Once divergence exceeds  $\Lambda_c$ , the observer's domain becomes topologically confined. Experience is therefore unique not by stipulation, but because no admissible path exists by which the observer can inhabit or access states outside the closure component that defines its reality.

Third, CUWF explains irreversibility through accessibility topology rather than through practical decoherence alone. When the accessibility graph fractures at the relevant connectivity threshold, the removed bridges are not merely difficult to reconstruct; they are structurally unavailable under the closure constraints of the disconnected domains. Irreversibility is thus not an emergent inconvenience of macroscopic complexity, but a direct consequence of topological disconnection within the entropic accessibility structure.

Taken together, these three points define the CUWF correction to MWI. CUWF does not merely rename branching. It introduces a distinct ontological layer—accessibility topology—and thereby replaces universal duplication with collapse-mediated separation inside one deeper wave reality. The result is a multiverse framework that preserves realism, explains determinate experience, and grounds irreversibility without proliferating worlds beyond structural necessity.