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Reconciling Quantum Paradoxes through Metaphysical Lenses: Mulla Sadra's Philosophy and Presentist-Fragmentalism

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Abstract

This article explores the potential for reconciling the fundamental paradoxes of quantum mechanics—the measurement problem, entanglement, and Schrödinger's Cat—with advanced metaphysical frameworks from both classical Islamic philosophy and contemporary Western thought. It specifically examines the compatibility and explanatory power of Mulla Sadra's transcendent philosophy, particularly his doctrines of Essential Movement, Existential Gradation, and the Primacy of Existence, alongside the modern philosophical interpretation of Presentist-Fragmentalism. By offering conceptual mappings and interpretations, this paper argues that these metaphysical perspectives can provide a more intuitive and coherent understanding of quantum phenomena, moving beyond the limitations of classical intuition and certain prevalent quantum interpretations.

Keywords

Mulla Sadra, Transcendent Philosophy, Presentist-Fragmentalism, Fundamental Paradoxes of Quantum Mechanics

1. Introduction

Quantum mechanics stands as one of the most successful scientific theories in human history, underpinning much of modern technology from lasers to transistors (Susskind & Hrabovsky, 2014). Yet, despite its unparalleled empirical accuracy, its implications for the nature of reality remain profoundly perplexing (Maudlin, 2019; Penrose, 2004). Unlike classical physics, which describes a deterministic world of definite properties, quantum mechanics presents a universe characterized by superposition, non-locality, and inherent uncertainty. These

counter-intuitive features give rise to well-known paradoxes such as the measurement problem, entanglement, and Schrödinger's Cat, which challenge our fundamental understanding of existence, causality, and observation.

Contemporary efforts to resolve quantum paradoxes frequently draw upon novel metaphysical frameworks. Paul Merriam's 2022 article, "Presentist Fragmentalism and quantum mechanics," (Merriam, 2022) offers a significant contribution in this regard, demonstrating how presentist fragmentalism can address long-standing issues like the apparent collapse in Schrödinger's Cat scenarios and the implications of Bell non-locality. While Merriam's analysis provides valuable insights into these, our study introduces Mulla Sadra's philosophy to argue for a more comprehensive solution. Specifically, we show how Mulla Sadra's unique understanding of existence and becoming, integrated with presentist fragmentalism, not only offers a distinctive reinterpretation of superposition and entanglement but also provides a powerful resolution for the measurement problem—a critical area not directly addressed in Merriam's aforementioned discussion.

The persistent challenges posed by quantum mechanical paradoxes, such as superposition and entanglement, have spurred a diverse array of interpretations beyond the standard formalism. Among these, Presentist-Fragmentalism offers a unique perspective, aiming to resolve these conundrums through a particular ontological framework. However, this interpretation is often classified as metaphysical rather than purely scientific due to its foundational commitments. Its key tenets, such as the inherent presentism of "fragments" of reality and their specific interactions, address "why" questions about quantum phenomena (e.g., the measurement problem) that extend beyond empirical description. Unlike testable scientific hypotheses, some of its core claims regarding the nature of "present" and the "becoming" of fragments lack clear falsifiability. Furthermore, the interpretation relies on presuppositions about time and reality (namely, that only the present exists in a fragmented manner), positioning it within philosophical debates rather than solely within empirically verifiable scientific frameworks. Consequently, presentist-fragmentalism is viewed more as an ontological framework for understanding quantum mechanics than a predictive scientific theory amenable to direct experimental refutation or validation. This paper aims to explore the potential for reconciling these quantum paradoxes by examining presentist-fragmentalism through the conceptual lenses of Mulla Sadra's transcendent philosophy. It can also offer novel avenues for understanding and potentially resolving these quantum paradoxes.

We will first introduce the core tenets of Mulla Sadra's transcendent philosophy, an influential school of thought from 17th-century Islamic philosophy, focusing on his doctrines of the Primacy of Existence, Essential Movement, and Existential Gradation (Minaee, 2025). Subsequently, we will delineate the key features of Presentist-Fragmentalism, a contemporary Western philosophical interpretation that addresses issues of time and measurement in quantum mechanics. By offering conceptual mappings and philosophical interpretations for each par-

adox through the lens of these frameworks, this article seeks to demonstrate their explanatory power and argue that they can provide a more intuitive and coherent understanding of quantum phenomena, moving beyond the limitations of classical intuition and certain prevalent quantum interpretations. Our thesis is that these frameworks offer a robust metaphysical grounding for the strange behaviors observed at the quantum level, not by denying them, but by providing a richer ontological context for their occurrence.

2. Conceptual Frameworks

To understand how these philosophies address quantum paradoxes, it is essential to first establish their core metaphysical principles.

2.1. Mulla Sadra's Transcendent Philosophy

Sadr al-Din Shirazi, known as Mulla Sadra (c. 1571/2-1640), was a Persian philosopher who founded the Transcendent Theosophy (al-Hikmat al-Muta'aliyah) (Rizvi, 2009; Morris, 2002). His system synthesized earlier Islamic philosophical schools (Peripatetic, Illuminationist) with Gnostic (Irfani) and theological insights, culminating in a radical re-evaluation of metaphysics. Three concepts are particularly pertinent to our discussion:

- **Primacy of Existence (Asalat al-Wujud):** This is the cornerstone of Sadra's philosophy. Contrary to earlier views that prioritized quiddity (essence or "whatness"), Sadra argued that *existence* (wujud) is the fundamental and primary reality. Quiddity, or essence (mahiyyah), is secondary—a mental abstraction or a delimitation that existence takes on. Things are what they are *because* they exist; their existence precedes and shapes their definable essence. This means that a thing's potentiality and actuality are rooted in its very act of existing, rather than its fixed definition.
- **Essential Movement (al-Haraka al-Jawhariyya):** Mulla Sadra famously introduced the doctrine of substantial or essential movement. Prior philosophers confined motion to accidents (qualities, quantities, positions). Sadra, however, posited that the very *substance* (jawhar) of all material things is in continuous, internal, and substantial motion. Reality is not static but a perpetual process of "becoming" (huduth), a constant renewal and transformation of existence. This inherent dynamism means that entities are always in a state of flux, constantly shedding and acquiring new perfections or imperfections.
- **Existential Gradation (Tashkik al-Wujud):** Sadra argued that existence is a single, unified reality (wahdat al-wujud) that nonetheless manifests in various degrees of intensity, perfection, and luminosity. Everything in existence is interconnected and derives from this singular reality, differing only in the strength or weakness, purity or impurity, of its existential instantiation. This means that being is not a collection of discrete, unrelated entities, but a continuous spectrum of existence, where differences are of degree, not kind. This concept implies a profound interconnectedness and unity underlying all apparent multiplicity.

2.2. Presentist-Fragmentalism

Presentist-Fragmentalism (PF), notably developed by Paul Merriam (Merriam, 2022), is a contemporary philosophical theory primarily aimed at reconciling presentism (the view that only the present exists) with special relativity and quantum mechanics. It offers a unique ontological structure for reality. Presentist-Fragmentalism circumvents no-hidden-variable theorems by redefining the nature of a pre-existing definite state. Unlike classical hidden variable theories that posit local, underlying properties, Presentist-Fragmentalism asserts that a definite state exists only in a separate, non-local "now". This unique temporal structure means that the definite values are not "hidden" in the conventional sense within the past or future light cones of a measurement event, but rather emerge from the inherent properties of the present fragment of existence. This framework therefore avoids the assumptions regarding locality and reality that underpin the no-hidden-variable theorems, allowing for a pre-existing definite state without contradiction.

- **Presentism:** PF fundamentally asserts that only the "now" is real. Past events are no longer existent, and future events do not yet exist. This stands in contrast to Eternalism, which views all moments in time as equally real.
- **Fragmentalism:** Reality is not a single, unified "now" for all things. Instead, different quantum systems or "fragments" of reality can have their *own* distinct "nows" (referred to as A-series time). This allows for the relativity of simultaneity inherent in Einstein's theory of relativity, as observers in different frames of reference can have different "nows." Crucially, these fragments are ontologically distinct until they interact.
- **B-series Relations:** While each fragment possesses its own dynamic A-series "now" (the flow from future to present to past), these fragments are connected by static B-series relations (earlier-than, later-than, simultaneous-with-respect-to-a-frame). These relations describe the order and connection between events across different fragments (McTaggart, 1908).

"Presentist-Fragmentalism fundamentally relies on an 'A-series time' framework, where moments are dynamically characterized by 'past,' 'present,' and 'future,' in contrast to the static, tenseless 'B-series time' where all events are merely ordered as earlier or later".

- **Mutual Quantum Measurement:** The key mechanism by which PF addresses quantum paradoxes. When two fragments (e.g., a quantum system and an observer) interact through a quantum measurement, their previously distinct A-series "nows" can "become one" or synchronize. This synchronization leads to a shared present and, consequently, a definite outcome for the previously indeterminate state. The "collapse" of the wave function is thus reinterpreted as the merging of distinct "nows."

3. Reconciling Quantum Paradoxes: A Metaphysical Interpretation

We now turn to how the conceptual frameworks of Mulla Sadra and Presentist-

Fragmentalism can shed light on, and offer resolutions to, the three classic quantum paradoxes.

3.1. The Measurement Problem: From Superposition to Definite Outcome

The Quantum Paradox: The measurement problem highlights the perplexing transition of a quantum system from a state of superposition (existing in multiple possible states simultaneously) to a single, definite state upon observation or measurement. For instance, an electron might exist as both spin-up and spin-down until measured. The "collapse" of the wave function lacks a clear physical mechanism within the standard formulation of quantum mechanics (Tomaz, et al., 2025). Our discussion on quantum measurement also draws from contemporary perspectives in physics, acknowledging recent developments in the field. For instance, discussions around the Frauchiger-Renner paradox (Waaijer & Neerven, 2021) shed light on the foundations of quantum mechanics and the nature of reality, further enriching our understanding of the measurement problem. Similarly, insights from work on quantum foundations, such as that by Brukner, provide a valuable counterpoint and complement to our philosophical analysis of quantum phenomena (Tang et al., 2023).

Simple Quantum Representation: Let the state of a particle (P) be represented as a combination of possibilities: State P = {Spin-Up, Spin-Down} (before measurement)

After a measurement operation (M): M (State P) → Spin-Up (or Spin-Down, but only one is actualized).

Mulla Sadra's Reconciliation: From Sadra's perspective, the "paradox" stems from conceiving of superposition in a static, classical sense. Instead, he would argue:

- **Primacy of Existence:** The particle's *existence* (EP) is primary and fundamental. The attributes "spin-up" and "spin-down" are *quiddities* (specific manifestations or forms) that can emerge from this existence. The superposition ({Spin-Up, Spin-Down}) is not a literal, simultaneous existence of two distinct quiddities, but rather represents the inherent *potentiality* within the particle's underlying existence.
  - "Mulla Sadra's emphasis on the 'Primacy of Existence' over 'quiddity' (Arabic: *māhiyya*), which refers to the essence or 'whatness' of a thing, independent of its existence"
- **Essential Movement:** The act of measurement is not an arbitrary external intervention forcing a choice, but rather a specific moment in the particle's ongoing Essential Movement. The "collapse" is not a static event but a dynamic process of "becoming," where a potentiality within the substance's constant flow of existence actualizes itself into a definite quiddity. While "Essential Movement" is fundamentally an ontological process describing the continuous actualization of existence, its physical manifestation in the context of quantum

measurement can be understood as the inherent drive of a system towards a more determinate state. This drive is catalyzed by interaction with the environment and measurement apparatus, aligning with the principles of decoherence. The environment effectively "amplifies" the system's "Essential Movement" towards a classical state by rapidly entangling with it, leading to the selection of a definite outcome and the formal post-measurement state update. In this view, decoherence provides the physical mechanism through which Sadra's philosophical concept of dynamic existence finds its expression in the quantum realm.

Mathematical Mapping (Sadra): Let EP denote the underlying existence of the particle. Before measurement, EP encompasses the *potential* for two distinct quiddities (Q Spin-Up, Q Spin-Down): EP ↔ {Q Spin-Up, Q Spin-Down} potential

Measurement (M) is an *interaction* that triggers the actualization of one quiddity from EP, as part of its ongoing Essential Movement: M(EP) ⇒ Q Spin-Up (Actualization of potential, a moment in becoming)

Philosophical Interpretation: The particle isn't *literally* both spin-up and spin-down simultaneously in any fixed sense. Its very existence holds the *potential* for these attributes. Measurement is thus interpreted as the dynamic process where this potential actualizes into one definite form, not a sudden "collapse" of something already ambiguously present, but a *becoming* of what was existentially possible.

Presentist-Fragmentalism's Reconciliation: PF addresses the paradox by challenging the assumption of a single, universal "now" before measurement.

- Before measurement, the particle exists in its own distinct "now" (Now Particle), where its state is already definite (either spin-up or spin-down), though unknown to the observer.
- The observer exists in a separate "now" (Now Observer), and from this perspective, the particle's state appears as a superposition because Now Particle and Now Observer are not yet synchronized.
- Measurement is the event where Now Particle and Now Observer merge or synchronize, forming a unified "now" for the combined system, at which point the definite state of the particle becomes manifest.

Mathematical Mapping (PF): Before Measurement (distinct "nows"): (Now Particle: {Spin-Up} OR {Spin-Down}) (definite state within its own fragment) (Now Observer: {Spin-Up, Spin-Down} potential) (perceived superposition from external fragment)

During Measurement (M), the "nows" synchronize: M (Now Particle, Now Observer) ⇒ (Now Unified System: Spin-Up) (or Spin-Down, now shared).

Philosophical Interpretation: The "collapse" is not an ontological change in the particle itself (it's always one or the other in its own "now"), but a shift in the *relationship* between distinct fragments of reality. The superposition is a descriptive artifact of an unsynchronized reality, not an inherent property of the particle's fundamental being in its own present.

3.2. Entanglement: Non-Locality and Interconnectedness

The Quantum Paradox: Quantum entanglement describes a phenomenon where two or more particles become linked in such a way that the quantum state of each particle cannot be described independently of the others, even when the particles are separated by vast distances. Measuring the state of one entangled particle instantaneously determines the state of the other, without any apparent signal traveling between them. This "non-locality" challenges the classical principle of locality (that distant objects do not affect one another directly, but only through local interactions) (Deng, 2023). This unified-existence view, while positing a deep interconnectedness, coexists with relativistic locality constraints because the observed correlations in entanglement do not involve the superluminal transfer of information, but rather reflect a pre-established, holistic reality that is revealed instantaneously across spatially separated events, as further confirmed by recent Bell-test experiments (Entangled Quantum Circuits, 2023; Wu et al., 2025; Ruberti et al., 2024).

Simple Quantum Representation: Let's denote the possible states for a single particle as:

- $|0\rangle$: Spin Up (e.g., along the Z-axis);
- $|1\rangle$: Spin Down (e.g., along the Z-axis);

For two entangled particles, P1 and P2, one of the most famous combined entangled states is the Singlet State (Guimaraes et al., 2024):

$$\left|\Psi^{-}\right\rangle = \frac{1}{\sqrt{2}}\left(\left|0\right\rangle_{P1}\left|1\right\rangle_{P2} - \left|1\right\rangle_{P1}\left|0\right\rangle_{P2}\right)$$

where,

- $|\Psi^{-}\rangle$: This is the standard notation for this specific entangled state (one of the four Bell states).
- $1/\sqrt{2}$: This is the normalization constant, ensuring that the total probability of finding the particles in any state sums to 1.
- $|0\rangle_{P1}|1\rangle_{P2}$: This term represents the state where Particle P1 is in the "Up" state and Particle P2 is in the "Down" state. (Sometimes written simply as $|01\rangle$ when the particle labels are implicit).
- $|1\rangle_{P1}|0\rangle_{P2}$: This term represents the state where Particle P1 is in the "Down" state and Particle P2 is in the "Up" state (Sometimes written as (Tomaz et al., 2025)).
- The minus sign (−) between the two terms indicates a specific phase relationship that defines this particular entangled state.

This equation describes a quantum superposition of two possibilities:

1) P1 is Up AND P2 is Down.

2) P1 is Down AND P2 is Up.

Before measurement, neither P1 nor P2 has a definite " Spin Up": M(P1) → P1-Up immediately, without any signal or "Down" state M(P2) → P2-Down. Their individual states are indefinite. However, their *combined state* is definite in that their spins will always be opposite. If you measure P1 and find it "Up," then you *know* P2 must be "Down," instantaneously, regardless of distance. Conversely, if

P1 is "Down," P2 must be "Up." This inseparable correlation is the hallmark of entanglement.

Mulla Sadra's Reconciliation: Sadra's concept of Existential Gradation offers a profound way to understand entanglement:

- **Existential Gradation:** All existence is a single, unified reality that manifests in various degrees of intensity and perfection. From this perspective, entangled particles are not truly separate or isolated entities. Instead, they are inherently interconnected and interdependent, being different manifestations or "degrees" (D1, D2) of a shared, underlying existential unity (UExist).
- Their "correlation" is not a strange action-at-a-distance, but rather a direct consequence of their being different modalities or degrees of the same continuous existence. The "instantaneous" determination is not due to a physical force traveling between them, but to their inherent, shared existential ground.

Mathematical Mapping (Sadra): Let UExist represent the underlying unified existence. Entangled particles P1 and P2 are seen as specific *degrees* (D1, D2) or manifestations of this unified existence: UExist ⇒ (D1 ↔ P1, D2 ↔ P2).

Their entanglement signifies that their specific manifestations (e.g., spin states) are inherently linked as properties of their common existential root: UExist ⇒ {Spin(D1) is inverse to Spin(D2)}.

Measurement of one (e.g., D1) reveals a definite aspect of this shared unity, which necessarily determines the other aspect (D2) within the same unified existence: M (D1) → Spin (D1) = Up Therefore, Spin (D2) = Down.

Philosophical Interpretation: The "spooky action at a distance" is an illusion. The particles are never truly separate in a fundamental sense; they are interwoven aspects of a deeper, unified existence. Their correlation is an intrinsic property of this fundamental unity, not a consequence of communication across space or time.

Presentist-Fragmentalism's Reconciliation: PF interprets entanglement as a specific kind of relationship between distinct "nows" or fragments:

- Entangled particles exist within a system whose "nows" are intrinsically linked or already synchronized. They represent a single, complex fragment (FP1P2) or a set of fragments whose A-series times are fundamentally connected.
- When one particle is measured, its fragment's "now" synchronize with the observer's "now," and by virtue of the pre-existing entanglement, the other particle's "now" immediately aligns with it.

Mathematical Mapping (PF): Let P1 and P2 exist within a potentially unified fragment FP1P2: FP1P2:(NowP1 and NowP2 are inherently linked).

Before Measurement (from NowObserver): The state describes the potential for their linked "nows" to synchronize with NowObserver. (NowObserver: {P1-Up/P2-Down, P1-Down/P2-Up} potential).

Measurement of P1 by Observer: M(P1) causes NowP1 and NowP2 to synchronize and become part of the observer's "now." This synchronization reveals one definite outcome from FP1P2: (NowUnified P1P2/Obs: P1-Up and P2-Down).

Philosophical Interpretation: The "instantaneous" correlation isn't superluminal communication, but the immediate consequence of distinct "nows" (or interconnected sub-fragments) becoming a single, unified "now" upon measurement. The entangled particles were always relationally determined within their own "fragmented" or linked reality; measurement simply makes this relationship apparent within our shared present.

3.3. Schrödinger's Cat: The Macroscopic Superposition

The Quantum Paradox: Erwin Schrödinger's thought experiment illustrates the absurdity of applying quantum superposition to macroscopic objects. A cat is placed in a sealed box with a radioactive atom (which has a 50% chance of decaying) linked to a vial of poison. According to quantum mechanics, the atom is in a superposition of "decayed" and "not decayed." Therefore, the cat, being entangled with the atom, is seemingly in a superposition of "alive" and "dead" until the box is opened and observed. This defies our classical intuition that a cat must be definitively either alive or dead (Raj, 2022).

Simple Quantum Representation (The absurdity): StateCat = {Cat-Alive, Cat-Dead} (before observation).

Upon Observation (O): O(StateCat) → Cat-Alive (or Cat-Dead, but only one is observed).

Mulla Sadra's Reconciliation: Sadra's philosophy provides a way to conceptualize this without resorting to the absurd notion of a "zombie cat":

- **Primacy of Existence & Essential Movement:** The cat's *existence* is primary and dynamic. Its aliveness or deadness are secondary quiddities or states of its being. The experimental setup intricately links the cat's fundamental existence to a quantum potential for substantial change (death). The superposition ({Cat-Alive, Cat-Dead}) does not mean the cat is simultaneously embodying both quiddities, but rather that its underlying existence, within the context of the experiment, inherently carries the *potential* for either outcome.
- **Existential Gradation:** "Alive" and "Dead" represent different degrees of the cat's specific existential manifestation. The state Ψ for the entire system encompasses the possibility of transitioning between these existential degrees. The "observation" is the act of interacting with this system, which precipitates one specific substantial transformation.

Mathematical Mapping (Sadra): Let ECat-System be the underlying existence of the entire integrated system (cat + atom + poison setup). Before observation, ECat-System contains the potentials for two distinct quiddities to manifest: ECat-System ↔ {QAlive-Cat, QDead-Cat} potential.

Observation (O) is an interaction that actualizes one quiddity from ECat-System, as part of its Essential Movement: O(ECat-System) ⇒ QAlive-Cat (Actualization of potential from E).

Philosophical Interpretation: The cat is not "literally" both alive and dead in any classical sense. Its *existence* is primary, and in this specific experimental setup,

that existence carries the *potential* for two different substantial outcomes. The "superposition" (as represented by Ψ) describes this inherent potential within the system's dynamic existence, which resolves into a definite state upon interaction, solidifying one specific quiddity. The paradox of the zombie cat is avoided by distinguishing between the primary, dynamic existence (which holds potential) and the secondary, definite quiddity that emerges upon actualization.

Presentist-Fragmentalism's Reconciliation: PF elegantly resolves Schrödinger's Cat by stating that the superposition is not experienced by the cat itself, nor does it exist in a universal "now" before observation:

- Before the box is opened, the cat and the internal quantum mechanism exist within one distinct "now" (NowCat-Box). From this internal perspective, the cat is definitively either alive OR dead (the outcome has already been determined within its isolated fragment's present, though unknown to the outside).
- Schrödinger and the outside world exist in their own separate "now" (NowSchrödinger). From this "now," the cat's state is a superposition because NowCat-Box is not yet synchronized with NowSchro¨dinger. There is no single, shared "now" in which the cat could be both alive and dead.
- Opening the box and observing the cat causes NowCat-Box and NowSchrödinger to merge, resulting in a single, shared "now" where the cat is definitively either alive or dead.

Mathematical Mapping (PF): Before Observation (distinct "nows"): (NowCat-Box: {Cat-Alive} OR {Cat-Dead}) (definite state within its own fragment's now) (NowSchrödinger: {Cat-Alive, Cat-Dead} potential) (perceived superposition from external fragment)

During Observation (O), the "nows" synchronize: O (NowCat-Box, NowSchrödinger) ⇒ (NowUnified System: Cat-Alive) (or Cat-Dead, now shared)

Philosophical Interpretation: The paradox vanishes because the contradictory states are never simultaneously real in a *single*, universal "now." The cat is always definitely alive or dead in its own "now." The superposition is merely a description from an unsynchronized "now" of the observer. The observation is the act of merging these temporal realities, bringing the cat's definite state into the observer's shared present.

Limitations and Scope

It is important to acknowledge that the metaphysical schemes presented, namely Mulla Sadra's philosophy and Presentist-Fragmentalism, while offering a novel conceptual framework for understanding quantum paradoxes, presently lack falsifiable empirical predictions. This paper is purely philosophical and aims to supply an ontological rather than empirical reconciliation of quantum phenomena. Our objective is to provide an alternative interpretive lens for quantum mechanics, demonstrating how these philosophical ideas can conceptually resolve issues such as the measurement problem, entanglement, and Schrödinger's Cat without requiring additional physical postulates or modifications to quantum theory itself. The scope of our claims is therefore confined to the philosophical realm,

offering a new way of thinking about quantum reality rather than proposing a testable scientific theory.

4. Concluding Remarks

The perplexing nature of quantum mechanics compels us to seek interpretations that transcend purely scientific descriptions. This article has explored the remarkable potential of two distinct metaphysical frameworks—Mulla Sadra's Transcendent Philosophy and Presentist-Fragmentalism—in offering coherent and intuitive resolutions to the measurement problem, entanglement, and Schrödinger's Cat paradox.

Mulla Sadra's philosophy provides a dynamic, existentially rich ontology where reality is fundamentally unified yet continually transforming. His concepts of the Primacy of Existence, Essential Movement, and Existential Gradation allow us to understand quantum superposition not as a static, contradictory state, but as a representation of the inherent *potentiality* within a substance's dynamic existence, actualizing into definite quiddities upon interaction. Entanglement, from this perspective, is not "spooky action at a distance," but an inevitable consequence of the deep interconnectedness of all things as manifestations of a single, graded reality.

Presentist-Fragmentalism offers a novel temporal ontology, positing a fragmented reality where different systems can possess distinct "nows." This framework resolves the paradoxes by arguing that macroscopic superpositions do not exist in a single, universal "now," but rather reflect a state of unsynchronized realities. Measurement, in this view, becomes the synchronization of these distinct "nows," leading to the emergence of a definite outcome in a newly shared present.

While Sadra's philosophy is rooted in classical Islamic intellectual traditions and Presentist-Fragmentalism in contemporary analytical philosophy of physics, their explanatory power converges on key points. Both frameworks challenge the classical intuition of a static, independently existing reality and emphasize the dynamic, relational, and potentially non-unified nature of existence prior to certain interactions. Sadra's ideas provide a holistic existential backdrop, while PF offers a specific temporal and ontological mechanism for quantum phenomena.

Future research could explore more formal mappings between philosophical concepts and quantum mathematical structures, or delve deeper into how these metaphysical interpretations might inform the development of new physical theories or help in adjudicating between existing quantum interpretations (e.g., Many-Worlds, Bohmian Mechanics). By integrating rigorous philosophical inquiry with the insights of quantum physics, we can move closer to a more comprehensive and satisfying understanding of the nature of reality.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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