TIME WITHOUT TIME: RELATIONAL ONTOLOGIES IN CONTEMPORARY PHYSICS, DIALECTICAL CRITIQUE OF THEIR PHILOSOPHICAL GENERALIZATIONS, AND PARALLELS WITH DAOISM AND MADHYAMAKA BUDDHISM

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Abstract

Recent work in physics challenges the idea that time is a fundamental, self-standing entity. In quantum gravity, relational quantum mechanics (henceforth – RQM), and process-based ontologies, time does not exist on its own. Rather, what we call time emerges from relations, event connections, and how we partition reality. Our sense of time arises from patterns and correlations, not from a separate, absolute dimension [Barbour 1999; Rovelli 2017]. This paper examines how these contemporary physical theories align methodologically with two ancient Asian philosophical traditions: Daoism and Madhyamaka Buddhism, which remain highly relevant today. According to the view presented in this article, these traditions did not anticipate modern physics nor did they serve as proto-scientific theories. Rather, they offer ways of thinking which resist rigid conceptions of time and keep inquiry sharp when no fixed timeline is available [Garfield 1995; Robson 2018]. The central claim is that modern physics, Daoism, and Madhyamaka all reject time as something substantial. Events do not exist independently; they occur within shifting relations, not as stable, unchanging bits of reality. Daoism presents a process-oriented outlook that discourages conceptual fixation, while Madhyamaka articulates a relational ontology grounded in dependent arising (*pratītyasamutpāda*) and emptiness (*śūnyatā*), denying inherent (*svabhāva*) existence.

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This paper highlights methodological parallels, showing how both traditions oppose the notion of time as a fixed, independently existing phenomenon. The discussion is supplemented by drawing on the European dialectical tradition, which offers tools for addressing change, contradiction, and relationality without reducing them to simple formulas.

Keywords: *relational ontology, quantum gravity, Daoism, Madhyamaka Buddhism, time, events, perception, dialectics, entanglement.*

Introduction

Few ideas seem as intuitively clear, and yet as theoretically unstable, as time. In everyday discourse, time is treated as a simple stage for events, a uniform flow that sequences experience. Modern physics, however, has increasingly placed pressure on this assumption. While classical physics treated time as a steady parameter for all motion, quantum theory and later – quantum gravity have introduced timeless or relationally emergent conceptions of time [Rovelli 2017; Barbour 1999]. Cross-cultural discussions of time often slip into metaphor or romanticized appeals to "Eastern wisdom" [Robson 2018]. This paper avoids such pitfalls, instead of examining the question whether Daoism or Madhyamaka "agree" with physics, exploring the ways how their methodological dispositions – non-reification, process-thinking, and relational analysis – parallel the conceptual moves required when time is no longer treated as fundamental. The central claim is that all three endeavours share a refusal to treat time, events, or entities as self-existing substances. The European dialectical tradition, with its focus on contradiction, change, and mutual constitution, provides a useful meta-framework for understanding this intersection [Adorno 1973; Dafermos 2014].

1. Physics without time

1.1. Foundational shift

Classical physics used time as a steady ruler for all motion. Then quantum theory arrived in the 20th century, built by Einstein, Bohr, Heisenberg, Dirac and others, and turned this view upside down. In quantum mechanics, there is no time operator that we can measure directly. What we can measure in experiments are change and correlation, not time itself [Rovelli 2017]. Carlo Rovelli argues that in relational quantum mechanics, time does not exist fundamentally. Each physical system has its own time, set by local interactions and the gravitational field around it. Time is not a thing; it emerges from the relations among events. Without these relations, there is no temporal structure: "We must not think of time as if there were a great

cosmic clock that marks the life in the universe. Every object in the universe has its own time, running at a pace determined by the local gravitational field. Things change only in relation to one another. At a fundamental level, there is no time." This implies that our feeling of the flow of time is only a rough approximation that works at our large scale, arising from the fact that we perceive the world in a coarse-grained way [Rovelli 2017].

In contemporary quantum information theory, Vlatko Vedral takes this idea even further, arguing more radically that time and space are not actually real things that exist out there in the universe. They do not have their own independent existence. They are merely tools we have devised to help us describe what is going on. According to him, the only things that truly exist are fields. Matter is held together by fields – like the electromagnetic field, which binds atoms, molecules, clocks, and measuring sticks. Gravity does not bend space or time themselves; instead, it acts directly on these fields and dictates their behaviour. So when clocks tick slower or rulers change length, it is actually the fields inside them responding to gravity, not time itself stretching or space itself warping. Vedral admits that talking about spacetime as if it were real makes calculations easier, but if one goes down to the most fundamental level, there is no space, no time, and no particles in the usual sense. There are only quantum quantities – what physicists call *q-numbers*. Those are the actual building blocks of reality. Time, just like space, only emerges from the way these quantum fields relate to each other. Time does not flow, space is not a "thing", and gravity is just another quantum field among many. Time is not fundamental – it is something we invent to make sense of change [Vedral 2025]. As he stated earlier, without interaction, there are no facts, and without facts, temporal structure has no physical meaning [Vedral 2010]. Time is not treated as a dimension in contemporary physics, but as the following phenomena:

- A network of events
- Relations between events
- Constraints on possible relations

Time becomes a useful shorthand rather than an ontological constituent [Barbour 1999; Rovelli 2017]. Quantum entanglement shows how temporal relations are less important than the relationships between things, thus challenging the idea that things are separate. From one perspective, quantum entanglement is not a miracle that creates reality; it is a physical condition arising from interaction and a common origin. When two particles become entangled, quantum entanglement joins them into a whole quantum state. According to this approach, what exists first is a state; later, we describe the shared state as parts. From this viewpoint, one might indeed get the impression that entanglement does not decide whether reality exists at all. Entangled particles do not have their own properties until we

interact with them. This suggests that the order we perceive in time may be a result of how things become real, not a hidden temporal container. In theory, the process never stops. The wave function keeps changing the correlations; interactions keep happening. What disappears when there are no relations or no observations is our access to time. For Rovelli, time is relational and local: the world does not have a single present; it only has events and the relations between events. This view is powerful, and, of course, it can slide toward the idea that facts exist only in relation. However, from a philosophical standpoint, this position risks sliding from an epistemic clarification into an ontological claim. The fact that time is not directly measurable and appears only through relations does not entail that reality itself consists only of relations. Such a move would conflate conditions of access (how we describe and measure phenomena) with conditions of being (what exists independently of those descriptions). In this sense, certain interpretations of RQM may inadvertently collapse ontology into operational description. We must take into account that relations, correlations, and informational quantities are mediations within theory and experiment, not self-subsisting ontological entities. The elevation of such formal structures to ontological primacy represents a shift from substance metaphysics to what may be called relational or formal absolutism. Interpreting RQM philosophically, it may therefore be better to say not that "time does not exist" in an absolute sense, but that time is not a fundamental substance. It is better understood as a relational and operational concept derived from physical processes. The statement "time does not exist" is therefore misleading if taken ontologically; it is more accurately interpreted as a critique of time as an independent, flowing entity. Quantum entanglement, for example, challenges the view that all physical properties are intrinsic and locally instantiated; meanwhile, it does not thereby license a broader philosophical generalization of the sort our authors tend to make – that reality is wholly reducible to relations.

In this light, contemporary physics reveals a shift: from time as an independent parameter to time as an emergent, relational descriptor of processes. Notably, this shift should be interpreted epistemologically, and not as a definitive ontological reduction.

1.2. What replaces "time"?

- Events – interactions or correlations between physical systems; events do not occupy an independent "moment" [Rovelli 2016].
- Order (Not Flow) – causal relations define sequences without invoking a global temporal flow.
- Intervals (Not Duration) – so-called "duration" is a comparison of counts of physical processes (such as caesium atomic transitions) [Barbour 1999].

- Motion Without Time – motion is a sequence of spatial-relational events; velocity is event-density along a path.
- Dynamics Without Time-Based Equations – laws describe allowed transitions between configurations, not evolution in time.
- Entropy Without a Time Arrow – apparent direction emerges statistically from configuration probabilities.
- Relativity Without Simultaneity – events not causally linked cannot be compared as "simultaneous" [Barbour 1999].

Core proposition: Time does not exist fundamentally; only events and their possible relations exist [Rovelli 2017].

These replacements suggest that time is not a primitive component of physical theory. However, a crucial philosophical clarification is required. The elimination of time as a fundamental variable does not imply the elimination of temporal structure altogether. Rather, temporal concepts reappear at higher levels as necessary tools for organizing experience, measurement, and theory. Time, in this sense, is not ontologically fundamental but epistemically indispensable. From a dialectical standpoint, the key error to avoid is the absolutization of these replacements. Events, relations, and informational structures should not be treated as ontological primitives that fully exhaust reality. Such a move would merely replace one abstraction (time as substance) with another (relations as substance). A more precise formulation would therefore be that time is not a fundamental entity, but rather a relational and emergent structure arising from the interaction of systems, which nonetheless remains indispensable for the organization of physical description. This preserves the insights of contemporary physics while avoiding the collapse of ontology into epistemology.

2. Dialectical perspective on events and relations

The European dialectical tradition rejects the notion of fixed, ahistorical essences, while equally resisting a reduction of reality to mere relations, instead conceiving entities as dynamically constituted through their relations and processes. Dialectics is a way to think about change and opposites. It holds that contradictions are not problems but steps in development [Hegel 1812/2010], and that reality is always more complex than our ideas about it [Adorno 1973]. Manolis Dafermos rightly emphasizes that dialectics is a method for thinking, not a formal tool [Dafermos 2014]. Dialectics offered European science a way to explore change and relationships, rather than focusing solely on static objects. This perspective allowed disciplines such as modern physics, biology, and the social sciences to move beyond strictly mechanistic ways of understanding the world. Unlike the attempts of quantum mechanical theorists to philosophically explain reality by absolutizing the specific

relativistic conclusions of empirical science, a dialectical approach, in my view, could offer a different perspective. For example:

- Events have potential. Without events, relations cannot arise. An event is a locus where possible interaction and determination happen.
- Relations give a fixed reality. Without relations, events cannot be defined, measured, or placed in an order. Relations make the potential of events become real.
- Mutual dependency, without reduction. Mutual dependency shows a unity of opposites that stay together. Events are abstractions that arise from material processes. Interaction reveals relations and makes them empirically accessible. One cannot reduce events to relations; events and relations together co-constitute reality.

The dialectical approach can guard against reducing the study of existence merely to relationships or to separate things, because it insists that processes have a reality that does not depend on measurement. In this context, the dialectical view acknowledges that our knowledge and the way we order those processes in time are always relational. Furthermore, by examining the approaches of Western empirical science (quantum mechanics) and philosophy (dialectics) together, we can already compare them with ancient Asian teachings – Daoism or Madhyamaka Buddhism – to understand the analogies more clearly, while also being aware of the differences.

3. Daoism: Thinking without reification

Daoism is not a physics theory. It is a way of thought that consistently rejects treating temporal patterns as solid things. Probably the value of Daoism today lies in its provision of a way of knowing – flexibility, open-mindedness, and focus on process – that helps to change intuition and to lower resistance to new ways of describing reality [Robson 2018; Kohn 2019]. Classical Daoist texts, particularly the *Daodejing* (*Tao Te Ching*) and the *Zhuangzi*, present reality as a continuous, unbroken process (*huà* 化) rather than a collection of discrete entities in time.

3.1. Processuality without substrate

The Dao (道) is called the Way or the process. Fixed ideas cannot hold the Dao. As the first chapter of the *Daodejing* states, "The Way that can be told is not the constant Way; the name that can be named is not the constant name" (*dào kě dào, fēi cháng dào; míng kě míng, fēi cháng míng*) [Laozi, trans. Lau 1963: 5]. This line indicates that the Dao is beyond any fixed idea, beyond how we label time. The Dao operates through naturalness or self-so-ness (*zìrán* 自然). It manifests an unfolding

that has no outside cause and no set time frame [Slingerland 2003]. In that sense, the Dao aligns well with process ontologies in physics that lack a background spacetime.

In *Zhuangzi*, for example, we find the butterfly dream passage. In this passage, Zhuangzi questions whether the reality of time sequence and fixed identity is real. He says, "Now I do not know whether I was then a man dreaming I was a butterfly, or whether I am now a butterfly dreaming I was a man" [Zhuangzi, trans. Watson 2013: 18]. This doubt about what we know reaches into certainty about time. It suggests that the order of time and the lasting self may be context-dependent, relationally constituted, and, like a dream, not absolute [Møllgaard 2007]. This mode of thinking emphasizes that there is no fixed "now" and no permanent "I".

3.2. *Wu wei* as non-intervention

The concept of *wu wei* (無為) is often translated as "non-action". Actually, it means non-coercive action that follows natural flows, minimizing the imposition of rigid conceptual frameworks, including temporal ones. This concept embodies a stance that tries to keep human conceptual structures away from forcing reality. As Chapter 37 of the *Daodejing* states: "The Way never acts yet nothing is left undone" (*Dao chang wu wei er wu bu wei*) [Laozi, trans. Lau 1963: 47]. This matches the view of relational quantum mechanics where the observer is part of the system. Minimal interference allows relational structures to show up, without being forced by fixed classical containers such as a universal time parameter [Kohn 2019].

3.3. Temporal fluidity in Daoist practice

Daoist meditation practices like "sitting in forgetfulness" (*zuowang* 坐忘) and "fasting of the mind" (*xinzhai* 心齋) aim to dissolve conceptual and temporal fixations. They try to break the patterns of thought that keep us stuck in past and future. Zhuangzi describes a state of listening where "past and present are not separate" (*gu jin bu er*) [Zhuangzi, trans. Watson 2013: 32], suggesting that time is a constructed idea, not a fact [Komjathy 2013]. This phenomenological discipline aims at de-temporalization and offers a counterpart to the theoretical breakdown of time in physics. A limitation is that Daoism offers no mathematics, experiments, or predictive models. Its contribution is epistemological and attitudinal: non-reductionism, tolerance of complementarity, and observer humility.

4. Madhyamaka Buddhism: Relational ontology and the deconstruction of time

Madhyamaka, founded by Nāgārjuna (c. 150–250 CE), analyses time as a dependent construct through *śūnyatā* (emptiness) and *pratītyasamutpāda* (dependent arising). It presents an idea that things exist only in relation, which in some ways aligns with contemporary physics.

4.1. *Śūnyatā* and the non-substantiality of time

Śūnyatā (Skt. शून्यता) is often mistaken for nihilism. Actually, it means the lack of any fixed, inherent identity (*svabhāva*, Skt. स्वभाव). In his *Mūlamadhyamakakārikā* (Skt. मूलमध्यमककारिका, *Fundamental Verses on the Middle Way*), Nāgārjuna deconstructs all categories, including the concept of time. Chapter 19, the examination of time (*kāla-parīkṣā*, Skt. काल-परीक्षा), demonstrates that past, present, and future all depend on each other and cannot exist independently. As he states, "If the present and the future depend on the past, then the present and the future would have existed in the past" (19.1) [Nāgārjuna, trans. Garfield 1995: 243].

4.2. *Pratītyasamutpāda* and temporal emergence

According to the principle of dependent arising (*pratītyasamutpāda*, Skt. प्रतीत्यसमुत्पाद), temporal moments arise only in dependence on conditions – a view analogous to relational physics. The *Madhyamakāvatāra* (Skt. माध्यमकावतार, *Entering the Middle Way*), by Candrakīrti (c. 600–650 CE), expands this idea. It shows how temporal distinctions arise from ignorance (*avidyā*, Skt. अविद्या), which makes fluid and connected phenomena appear solid. In this context, temporal experience is conventional truth (*saṃvṛti-satya*, Skt. संवृति-सत्य) and not ultimate reality (*paramārtha-satya*, Skt. परमार्थसत्य) [Huntington 1989].

4.3. The two truths and temporal experience

According to Madhyamaka doctrine, conventional time (*saṃvṛti-satya*, Skt. संवृति-सत्य) functions for daily life and science, but ultimate analysis (*paramārtha-satya*, Skt. परमार्थ-सत्य) reveals time's emptiness. This idea resonates with the quantum distinction between measurable time used to track change and the fundamental timelessness appearing in underlying equations [Westerhoff 2009]. Madhyamaka does not predict physics but deconstructs substantialist assumptions, offering conceptual tools for critiquing reified notions of time.

5. Critical section: The mystification of "Eastern wisdom"

5.1. Category error: Wisdom as explanation

Daoism and Madhyamaka are sometimes presented as if they were meant to explain physical reality. The claim that Buddhism anticipated quantum mechanics commits a category mistake. Daoism and Madhyamaka focus on how the mind clings to ideas, how this shapes experience, and (in Buddhism) how it creates suffering. They do not aim to predict or measure things in the way natural science does.

5.2. Metaphor smuggled as ontology

Daoist and Buddhist texts use metaphor, negation, and paradox to disrupt habitual thinking. In simplistic scientific readings, these literary devices are often taken literally. For example, the Daoist concept of *wu* (無, non-being) is sometimes compared to the quantum vacuum, and the Buddhist concept of *śūnyatā* (Skt. शून्यता) is likened to quantum indeterminacy. Such comparisons miss the primary function of these concepts: to stop treating ideas as things and to prevent the mind from reifying concepts [Ziporyn 2012].

5.3. Romanticization of anti-mathematical insight

There is a myth that Eastern philosophies provide a superior intuition-based way to perceive reality, compensating for the cold abstraction of Western mathematics. Unfortunately, this myth ignores the fact that modern physics derives its power from formal rules, consistency, and empirical testing. It also overlooks the logical formalism that exists within traditions like Madhyamaka.

5.4. A productive boundary

If physics is responsible for constructing formal models constrained by empirical adequacy and predictive power, then Daoism and Madhyamaka are conceptual and phenomenological disciplines aimed at dismantling absolutist assumptions and attaining wisdom or liberation. The fruitful intersection does not require synthesis or direct mapping. It can be found in a shared methodological refusal to treat time, events, or entities as if they exist by themselves. Both traditions analysed in this article, in their own ways, discipline thought to overcome the limits of substance-based metaphysics.

6. Integrating approaches: Methodological parallels

Aspect	Physics (QM & QG)	Daoism	Madhyamaka Buddhism
Fundamental Units	Events, quantum correlations, relational interactions [Rovelli 2017; Vedral 2025]	Process (*Dao*), transformation (*huà* 化), virtuosic power (*de* 德)	Dependent arising (*pratītyasamutpāda*, Skt. प्रतीत्यसमुत्पाद), emptiness (*śūnyatā*, Skt. शून्यता)
Temporal Status	Emergent from relations; no time operator in QM; timeless formulations in QG	Non-reified flow, temporal fluidity, "past & present not separate"	Conventionally real only (*saṃvṛti-satya*, Skt. संवृति-सत्य), empty of inherent existence (*svabhāva-śūnyatā*, Skt. स्वभाव-शून्यता); moments are mutually dependent
Epistemic Approach	Discretization via measurement; time as informational/ operational tool	*Wu wei* (無為) as non-intervention; *zuowang* (坐忘) as de-temporalization	Two truths doctrine: conventional (*saṃvṛti-satya*, Skt. संवृति-सत्य) vs. ultimate reality (*paramārtha-satya*, Skt. परमार्थ-सत्य) of time
Predictive Power	Yes (formal, mathematical, empirical)	No	No
Conceptual Utility	Structural clarity, mathematical modelling of relational structures	Method of thought, phenomenological discipline, flexibility, tolerance of paradox	Relational ontological insight, logical deconstruction of reification

7. Limits and boundaries

Daoism and Madhyamaka do not replace physics but offer complementary epistemic disciplines that resist reification [Robson 2018; Garfield 1995]. Physics, in turn, can benefit from philosophical critique of its implicit metaphysical assumptions (e.g., "flowing time"). The intersection is methodological instead of explanatory, and gains value from a shared critique of absolutism. The value of dialogue is that it allows each side to illuminate the other.

Conclusion

This paper distinguishes a methodological resonance – not an explanatory one – between three distinct intellectual endeavours:

1. Physics without time, which treats time as emergent from events and their relations.
2. Daoist non-reifying process-thinking, which cultivates a mind attuned to change and avoids conceptual fixation.
3. Madhyamaka relational ontology, which deconstructs inherent existence and shows all phenomena (including time) as dependently arisen.

The comparative approach reveals how different traditions arrive at resonant ideas through different methods. Physics uses mathematics and experiments. Daoism uses practice and metaphor. Madhyamaka uses reasoning and epistemological analysis. The modern dialectical approach, which began in the 19th century and developed further in both Western and Asian philosophies, deepens this view by highlighting how events and relations mutually shape one another without being reduced to a single explanatory level. Each tradition points toward a view of time that is relational, emergent, and unfixed. This view can indeed change how we experience time. Physics provides the formal-empirical tools to model these phenomena; Daoism and Madhyamaka offer disciplined ways of thinking that resist substantialist intuitions.

The value of this cross-cultural dialogue lies not in seeking "proof" of physics in ancient texts, but in illuminating how different traditions, through distinct methods, converge on a non-substantialist view of time – one that is relational, emergent, and open to re-conceptualization as our understanding of reality deepens.

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