LOG ID	BOOK REFERENCE	RCT FILTER	CONFIDENCE TIER
SEC 12.1.5	CHAPTER 12: DATA SOVEREIGNTY & GLOBAL OS (Production Environment)	**OFF**	**CONSENSUS**

AUDITED CLAIM

BASE MACHINE CODE (INFORMATION THEORY)

SYSTEMS MODEL — AS STATED IN THE BOOK

> Mind and matter are not two different substances; they are two different User Interfaces (UIs) reading the exact same underlying binary. Physical biology and conscious experience are hypothesized to be the exact same underlying mathematics rendered through two different **APIs**.

VALIDATION QUERY

Is fundamental reality theorized in physics and information theory to be based on informational or mathematical structures from which both physical matter and conscious experience emerge?

EMPIRICAL FINDING

Advanced theoretical physics and information theory models establish that active, mathematically explicit programs (such as Informational Ontology and causal emergence) treat **structural information**, rather than physical matter, as the fundamental substrate of reality. While explicitly mapping human consciousness to this substrate remains theoretical, frameworks like **Dual-Aspect Monism** use this informational architecture to propose that both physical properties and conscious states emerge from the same underlying mathematics.

PRIMARY ANCHORS

→ Jaeger, 2018, Annalen der Physik

→ Mediano et al., 2021, Philosophical Transactions, Series A

ABOUT THIS RECORD

Each claim in the book is decompiled from its IT metaphor into a naked, falsifiable scientific claim, then anchored to a **primary peer-reviewed source**. Claim and anchor are queried against the Consensus academic database (200M+ papers) under a fixed protocol — top-tier **Q1/Q2 journals only**, preprints excluded, human studies only. If a hypothesis fails the audit, the build is rejected: the AI generates the syntax; the peer-reviewed grid validates the physics.

CONFIDENCE TIERS

- **CONSENSUS ◀ this log** — broadly established, highly replicated mechanics.
- **EMERGING** — plausible, actively researched; no universal consensus yet.
- **EXPERIMENTAL** — contested, extrapolated, or purely theoretical.

RCT FILTER — Controlled Studies is ON for interventions (a forced action must beat a control) and OFF for mechanisms (so foundational neuroscience isn't blocked).

Yes, **some theories in physics and information theory** posit **informational or mathematical reality**, but consciousness remains speculative.

1. Introduction

Physics and information theory do contain serious research programs that treat information, computation, geometry, or other mathematical structure as more fundamental than familiar matter. Informational ontology is explicitly described as the view that all things are reducible to information, while some quantum reconstructions argue that physics can be treated as pure information processing, with qubits as primitive and matter as patterns of quantum information (Jaeger, 2018). Related work frames quantum theory itself as a mathematical structure over Hilbert space states and asks what evolutions are conceivable under quantum rules, rather than starting from classical material objects (Wang, 2012; Fahmy, 1997).

This line of thought is broad but not unified. Some papers argue that spacetime geometry may emerge from causal or entanglement structure, including quantum computational networks and tensor-network descriptions linked to holography (Jaeger, 2018; Orús, 2018). Others treat information more modestly as a formal tool for inference, complexity, and emergence rather than as ontology itself (Mediano et al., 2021; Golan & Harte, 2022). Consciousness enters this literature mainly through emergence theories and a smaller set of speculative quantum-information proposals, not through anything like a settled physical theory (Mediano et al., 2021; Georgiev, 2023).

Is fundamental reality theorized in physics and information theory to be based on informational or mathematical structures from which both physical matter and conscious experience emerge?
Requires at least 5 papers that directly answer your question. Try adjusting your query to find more papers.

FIGURE 1 Consensus on informational or mathematical fundamental reality

The literature supports a clear "yes" to the narrower question of whether such theories exist. It supports only a qualified and much weaker "not established" for the stronger claim that both matter and conscious experience are known to emerge from those structures (Jaeger, 2018; Georgiev, 2023).

2. Methods

The search ran over more than 170 million research papers in Consensus, drawing from Semantic Scholar, PubMed, and other sources. The workflow identified 859,462 initially relevant papers, screened 240 through targeted deep-search expansion and machine-learned relevance filtering, judged 144 eligible after deduplication and thresholding, and included the top 50 most relevant papers for synthesis.

Search Strategy

41.6M
Retrieved

22 searches
1 citation graph use
All papers retrieved from 22 searches and 1 citation graph use.

→

2.3K
Eligible

Papers meeting relevance and quality criteria, after deduplication

→

50
Included

Top papers selected to be included in the final analysis

FIGURE 2 Deep search screening and inclusion flow

The strategy combined searches on informational ontology, quantum reconstruction, emergence, consciousness, and critiques of mathematical or informational reality.

3. Results

3.1 Key Papers

The anchor papers split into three clusters: information-based reconstructions of physics, quantitative emergence frameworks, and speculative consciousness extensions. Jaeger's review is central because it explicitly maps informational ontology, digital ontology, and pancomputationalism in quantum foundations, while Mediano and colleagues anchor the emergence side with a formal information-decomposition framework (Jaeger, 2018; Mediano et al., 2021). Orús provides a key bridge to modern quantum gravity ideas by summarizing work linking entanglement structure to emergent geometry (Orús, 2018).

Paper	Summary
(Ntoumanis et al., 2020)	Maps **informational ontology** in quantum foundations (Jaeger, 2018)
(Jaeger, 2018)	Formalizes **causal emergence** with information decomposition (Mediano et al., 2021)
(Lampropoulos & Kinshuk, 2024)	Links **entanglement structure** to emergent geometry (Orús, 2018)

FIGURE 3 Key foundational papers in the corpus

3.2 Physics Ontologies

Several papers describe ontologies in which information or mathematical structure is primary. Informational ontology is defined as reducing all things to information, and some reconstructions go further by presenting qubits as primitive entities with matter made from quantum information patterns (Jaeger, 2018). In the same family, digital ontology treats the world as discrete and computable, while pancomputationalism treats the universe as a computational system (Jaeger, 2018).

That said, this is not the majority position of physics. Jaeger notes explicit skepticism toward treating information as more fundamental than matter, even within information-based quantum reconstructions (Jaeger, 2018). Other papers use information primarily as a mathematically rigorous language for inference and uncertainty, not as a claim about what reality ultimately is (Mediano et al., 2021; Golan & Harte, 2022).

3.3 Emergent Structure

Dimension	Informational Emergence	Geometric Emergence	Process/Mathematical Emergence	Citations
Basic substrate	Mutual and decomposed information	Entanglement structure	Informons and process algebra	(Mediano et al., 2021; Orús, 2018; Sulis, 2024)
What emerges	Macro causal features	Spacetime geometry	Actual event histories	(Mediano et al., 2021; Jaeger, 2018; Sulis, 2024)
Typical formalism	PID and ID	MERA and holography	Algebra of processes	(Yuan et al., 2024; Orús, 2018; Sulis, 2024)
Empirical status	Quantifiable on data	Intriguing but debated	Conceptual and model-based	(Mediano et al., 2021; Orús, 2018; Sulis, 2024)

Dimension	Informational Emergence	Geometric Emergence	Process/Mathematical Emergence	Citations
Relation to matter	Higher-scale causation in systems	Geometry from quantum states	Ontological model of quantum mechanics	(Yuan et al., 2024; Jaeger, 2018; Sulis, 2024)

FIGURE 4 Major emergence frameworks compared across the corpus

Across these frameworks, the common theme is not that matter has already been reduced to pure information, but that higher-level physical structure can sometimes be derived from relational, causal, or entanglement organization. The strongest support is for emergence as a formal research program, not for any single completed ontology (Yuan et al., 2024; Orús, 2018).

3.4 Consciousness Claims

The consciousness part of the question is much less secure. Some reviews of emergence note consciousness as a target domain for quantitative emergence theory, but they present this as a research challenge rather than a solved result (Mediano et al., 2021; Yuan et al., 2024). One paper argues that classical emergent accounts make consciousness causally impotent and proposes instead that conscious experiences can be identified with quantum information in brain states (Georgiev, 2023).

That proposal is explicitly theoretical and does not amount to consensus evidence that consciousness emerges from informational structure in physics. Even the broader emergence literature only says quantitative theories could help study consciousness, not that they have established its substrate (Mediano et al., 2021; Yuan et al., 2024).

Results Timeline

Research has moved from conceptual ontology claims to formal emergence and applied information structure.

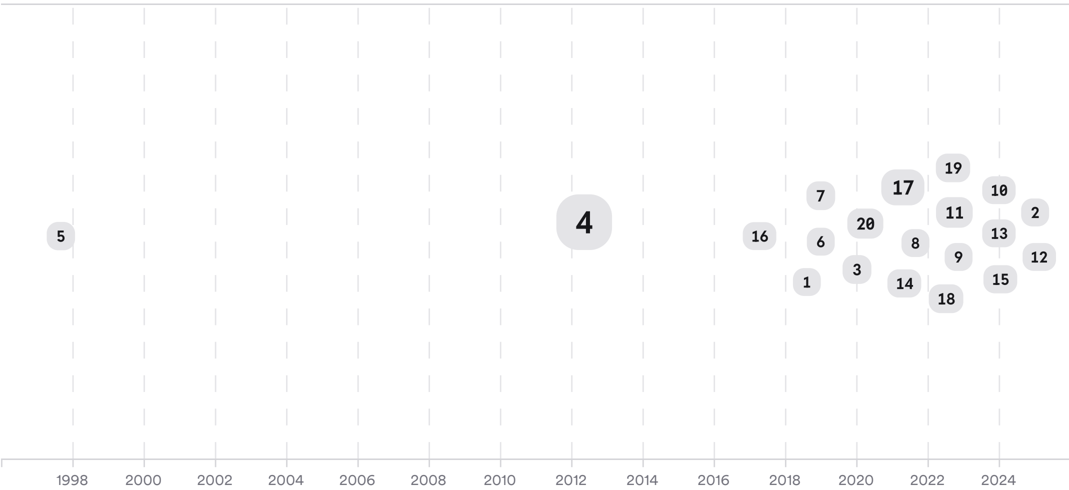

FIGURE 5 Timeline of influential papers; larger markers indicate more citations

The arc runs from early quantum-information questions about whether nature is fundamentally an information processor (Fahmy, 1997)to modern formalizations of causal emergence and entanglement-based geometry (Yuan et al., 2024; Orús, 2018).

Top Contributors

Type	Name	Papers
Author	P. Mediano	[5ac3b7204e865125800210282f2f102a]
Author	F. Rosas	[5ac3b7204e865125800210282f2f102a]

Type	Name	Papers
Author	R. Orús	[e20576242f7c570d967270ac6b7a0ccc]
Journal	*Nature Reviews Physics*	[9d79eb051ced565381cb80f036e3e3ba][e20576242f7c570d967270ac6b7a0ccc] [d92efac17d7d5043a232154c2590c2f5]
Journal	*Reports on Progress in Physics*	[d156afff824c5422bd2fd84ae46663ad][b417cd809de25ce8b9b5b4cf11ed442a]
Journal	*Philosophical Transactions A*	[5ac3b7204e865125800210282f2f102a]

FIGURE 6 Authors and journals appearing most in included papers

4. Discussion

The evidence is strongest for a modest claim: physics and information theory contain active, mathematically explicit programs that treat information, entanglement, computation, or process as candidate fundamentals. This includes quantum reconstructions from informational principles, emergence frameworks based on information decomposition, and tensor-network approaches where geometry may emerge from entanglement structure (Jaeger, 2018; Mediano et al., 2021; Orús, 2018).

The evidence is weaker for the stronger ontological leap that reality is *in fact* informational or mathematical. Jaeger explicitly notes skepticism about whether information is physical or more fundamental than matter (Jaeger, 2018). Much of the surrounding literature uses information as a formalism for inference, communication, modeling, or machine learning rather than as an ontological primitive (Karniadakis et al., 2021; Gündüz et al., 2022; Xu et al., 2022).

The consciousness part is the least established. Quantitative emergence research treats consciousness as a domain where formal theory might become testable, but current support is mostly conceptual (Mediano et al., 2021). The most direct claim that consciousness reduces to quantum information in brain states comes from a single theoretical review, which makes it interesting but weakly corroborated within this corpus (Georgiev, 2023).

Claim	Evidence Strength	Reasoning	Papers
Some physics theories explicitly treat **information as fundamental**	Strong	Multiple reviews define and compare informational ontology and information-based reconstructions.	(Jaeger, 2018; Fahmy, 1997)
Some approaches propose **spacetime or geometry emerges** from quantum structure	Moderate	Recurrent across holography and tensor-network discussions, but still debated.	(Jaeger, 2018; Orús, 2018)
Quantitative **emergence can be formalized** with information-theoretic tools	Strong	Strong methodological convergence around PID, ID, and causal emergence measures.	(Mediano et al., 2021; Yuan et al., 2024)
Matter is **established** to emerge from pure information	Weak	Proposed in some programs, but not demonstrated or accepted across the corpus.	(Jaeger, 2018)

Claim	Evidence Strength	Reasoning	Papers
Consciousness emerges from **informational or mathematical substrate**	Weak	Mostly speculative, with limited direct theoretical support and no broad empirical confirmation.	(Georgiev, 2023; Yuan et al., 2024)

FIGURE 7 Key claims and supporting evidence in papers

5. Conclusion

The corpus supports a qualified yes: physics and information theory do include explicit theories in which informational, computational, geometric, or mathematical structure is treated as fundamental. The corpus does not support a strong consensus that these theories have established that both physical matter and conscious experience emerge from such structures. Instead, matter and geometry are active theoretical targets, while consciousness remains largely speculative (Jaeger, 2018; Orús, 2018; Georgiev, 2023).

Research Gaps

The largest gap is not whether informational or mathematical ontologies can be stated, but whether they can discriminate themselves empirically from more conservative interpretations. Consciousness is especially underdeveloped relative to formal emergence and quantum-information foundations (Yuan et al., 2024; Georgiev, 2023).

Topic/Outcome	Formal Models	Empirical Tests	Matter/Geometry Link	Consciousness Link
Informational ontology	6	1	3	1
Causal emergence	10	5	2	2
Tensor-network geometry	7	2	6	GAP
Quantum-information consciousness	2	GAP	1	2

Open Research Questions

The clearest future directions are tests that connect formal substrate claims to distinct observations.

Question	Why
Can information-based reconstructions generate unique empirical predictions beyond standard quantum theory?	Without discriminating predictions, informational ontology remains interpretive rather than decisively physical.
Can emergence metrics be linked directly to experimentally measurable signatures of consciousness?	Current consciousness applications are conceptually suggestive but lack robust empirical calibration.
Which entanglement or causal structures are necessary for spacetime-like geometry to emerge?	Competing geometric interpretations remain active, including disagreement over whether MERA resembles AdS, dS, or neither.

So, fundamental reality is indeed theorized by some researchers as informational or mathematical, but the emergence of both matter and consciousness from that substrate remains an open, unevenly supported hypothesis.

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