

A New IN-SCIght of IN-formational SCIENCE

The primacy of mind and consciousness to the nature of reality, as espoused by Max Planck, David Bohm and many other pioneering scientists, is the foundational premise of *The Cosmic Hologram*. It shows that universal mind, articulated as digitized information and represented as dynamic and relational patterns and processes of, vitally, meaningful information, literally in-forms the formation of our Universe.

In addition to fast growing scientific evidence at all scales of existence and across numerous fields of research that our Universe is innately in-formed, so is compelling evidence that its appearance is also holographically manifested.

The Cosmic Hologram describes how the meaningful in-formation of our Universe is expressed in complementary ways as conserved and quantized energy-matter as described by Quantum theory and as in-tropic space-time as described by Relativity theory.

Restating and expanding the first two laws of thermodynamics as two laws of infodynamics, points to how the apparent differences between the two theories are naturally resolved, and shows how our Universe is able to respectively exist and evolve as a unified entity.

One, if not perhaps the most, fundamental concepts we'll further meet in *The Story of Gaia*, is that of in-tropy. Expanding the traditional concept of entropy as the number of energetic microstates of a system, to intropy, as the informational content of a system, (both described by the same equation) the concept of in-tropy goes one vital step further; to describe a system's *meaningful* in-formational content.

In considering intropy this way, it resolves the misperception of a contained system (as is our entire Universe) going from order to disorder over time, to its embodying increasing informational content. Given the innately meaningful nature of our mindful Universe, expanding intropy further to in-tropy shows how everything within it contributes to its overall in-tropic evolutionary flow.

Doing so, also removes the notion of negentropy or syntropy, as a somehow reversal of entropy in an open sub-system, such as a planet or an organism, that exists far from states of equilibrium. An ongoing flowthrough and dissipation of energy through them, enables them to come into coherence and then continue to amass in-tropy before eventually decohering; for example, as a result of the removal of the energy source and/or the completion of their lifecycle

To further appreciate the infodynamics of both contained and open systems, we'll also reconsider and restate the third law of thermodynamics, that of the temperature of a system, in term of infodynamics and see that it further explains why space expanding and its temperature falling, adiabatically drives the in-formationally in-tropic Universoul lifecycle.

When key cosmological attributes are allied with this emerging understanding of the fundamental role of information, and crucially meaningful in-formation with the holographic principle, an integral model can be developed in which the 'Big Breath' of space expanding and time flowing embodies ever-increasing in-tropic information and evolutionary complexity through the finite lifecycle of our Universe.

Any mathematical notation is deliberately excluded here as the mathematical formalism of the laws of physics are already articulated. Instead, this new *IN-SCIght of IN-formational SCIENCE*, points the way to reconciling Quantum and Relativity theories and shows how our Universe comes to exist and evolve as a unified entity

Here are the basic premises of this new IN-SCIght of IN-formational SCIENCE:

Information is physically real

Scientific evidence at all scales of existence and across numerous fields of research is discovering that our Universe is fundamentally interconnected, interdependent and ultimately unified^{1,2,3,4,5,6,7}.

Whilst apparently solid, physicists have realised for many years that the physical world is incredibly ephemeral. And an experiment reported in 2012 demonstrated the fundamental nature of information by showing that deleting one digitized bit, releases actual physical heat and in line with theoretical predictions⁸.

This and many other examples of increasingly compelling evidence¹ are showing that such digitized information, the basis for all our computer and communications technologies, is exactly the same as universal information, also articulated as digitized bits, that underpins and literally makes up all physical reality.

Key attributes of our Universe

The following key attributes of the physical reality of our Universe are being progressively supported by cosmological evidence.

Spatially, it is geometrically flat and otherwise the mathematical equivalence of energy and matter would be violated.

It is finite. Beginning as a finite event 13.8 Ga, the WMAP analysis of CMB wavelength distribution has a finite cutoff and on a logical basis there are no infinite physical quantities within space-time. In addition, the great majority of hydrogen in our Universe has already been processed into stellar nucleosynthesis and the reducing temperature of ambient space (currently at 2.7° K) both suggest a finite end.

It is contained in space-time otherwise universal conservation of quantized energy-matter would be violated.

Space expands and time flows from their finite origin.

It is nonlocally integrated. Bell's Theorem requires this for Quantum Mechanics to work and nonlocal entanglement has been experimentally demonstrated to 12.2 billion light-years from Earth⁹.

Key Framework of our Universe

Supported by a theoretical frame-work and evidence at all scales of existence and across numerous fields of research with digitized information pixelated at the Planck scale area of the 2-D holographic boundary/brane of space-time, the reality of our Universe is manifested holographically¹. The first direct cosmological evidence for this was demonstrated in 2017¹⁰.

Whereas a hologram captures information about a 3-D object onto a 2-D film, then projects it to create the holographic appearance, or hologram, of the 3-D object, cosmologists are realising that our entire Universe takes information held on its 2-D boundary and holographically projects it to create the 3-D appearance of reality.

The latest scientific evidence is revealing that our Universe is a 'cosmic hologram' that exists and evolves as a unified and finite thought form in the infinite mind of the Cosmos.

Based on these premises the first two Laws of Thermodynamics can be restated and expanded as two Laws of information; Infodynamics, as follows.

The 1st Law of Thermodynamics states that: the total energy of a contained system is conserved through time. As:

- Our Universe is a contained system

- Energy and matter are equivalent – $E=mc^2$

The total energy-matter of our Universe is conserved.

As Quantum Theory is a description of universal and quantized energy-matter, this is its most simple and generalized statement. Further, as:

- Information is physically real and can be expressed as energy-matter

Information expressed as the energy-matter of our Universe is universally conserved.

Thus, the 1st Law of Infodynamics states that: Information expressed as the total and quantized energy-matter of our Universe is conserved through time.

The 2nd Law of Thermodynamics states that: the total entropy of a contained system always increases over time.

The entropy of a contained system is a measure of its energetic microstates. As:

- Our Universe is a contained system
- Relative time and relative space are combined as invariant space-time
- Space-time began in a state of lowest entropy¹¹

The total entropy of our Universe always increases over space-time.

As Relativity Theory is a description of space-time, this is its most simple and generalized statement. Further, as:

- Our Universe is manifested holographically with digitized information pixelated at the Planck scale and encoded on its 2-D boundary/brane

Time flows and space expands to intropically express ever more informational content within space-time.

The flow of time itself is thus the intropic accumulation of the informational content of our Universe.

Thus the 2nd Law of Infodynamics states that: Information, expressed intropically as the space-time of our Universe, always increases through time.

As for their Thermodynamic subset, the two Laws of Infodynamics are both required to describe the fundamental nature of our Universe and show how Quantum and Relativity Theories are complementary and so can be reconciled with each other – and how respectively they enable our Universe to exist and evolve as a unified entity

The third law of Thermodynamics states that: The entropy of a system approaches a constant value as its temperature falls to absolute zero.

A correlate is that a finite system can never achieve absolute zero temperature.

In infodynamics terms the temperature of a system is a measure of its potential to sustain further actualization of intropy through time.

In a contained system (as is our entire Universe) it is in an inverse relationship with intropy and their interplay represents the unfolding cycle of the system; with intropy increasing and temperature correspondingly decreasing through time.

Our Universe began at its highest Planck scale temperature and lowest Planck scale intropy and ever since, as space has expanded and time flowed, its intropy has increased and its temperature fallen.

In an open system, as are many subsystems of our Universe, including planets, ecosystems and people, temperature is also a measure of its disequilibrium with its surroundings.

Energy flow and dissipation through an open system in disequilibrium is required to maintain its temperature and so sustain its ongoing potential to actualize further intropy through time.

A new INSCight to a new IN-SCIght

A new INSCight posits how the appearance of our Universe manifests and how its lifecycle proceeds.

Foundationally though such a framework is only able to account for meaningful information, literally in-forming the emergence of energy-matter and space-time, if cosmic mind, intelligence and consciousness are primary to and all-pervasive throughout their universal expression.

The universal 'alphabet' of 1s and 0s is combined at all scales of existence to meaningfully in-form the existence and evolution of our Universe.

The 1st Law of Infodynamics algorithmically enables our Universe to exist and the 2nd Law of Infodynamics enables the informational content (intropy) of our Universe to increase, with the third law of infodynamics showing how reducing temperature correlates with increasing intropy over time.

However, the primacy and all-pervasiveness of mind and consciousness are fundamental in articulating these algorithms and the Universoul's meaningful existence and evolutionary impulse from in-formational simplicity to complexity and ever-increasing self-awareness.

And so, a new INSCIght expands further to become an IN-SCIght of IN-formational SCIENCE.

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