Short Communication *Open Access*

Journal of Modern Classical Physics & Quantum Neuroscience

ISSN: 3068-4196

DOI: doi.org/10.63721/26JPQN0203

Evaluations of the Second Law of Thermodynamics & the Principle of Multiple Patterns

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Citation: *Christopher Portosa Stevens (2026) Evaluations of the Second Law of Thermodynamics & the Principle of Multiple Patterns. J. of Mod Phy & Quant Neuroscience 2(5), 1-4.WMJ/JPQN-203*

Abstract

This paper demonstrates evaluations of the Second Law of Thermodynamics from the standpoints of physical and biophysical concepts of information, and seeks to show that, in the evolution and growth of the universe and this solar system, stars and planets become more complex and abundant in their inorganic and organic compounds, not less, thus empirically contradicting the implications of the Second Law of Thermodynamics and the Theory of Entropy. The paper seeks to show that there are multiple patterns in the Universe and this solar system including patterns that contradict the Second Law of Thermodynamics: these include the nuclear explosions of stars that produce increasing complexity and organic compounds, the cooling of planets that produce terrestrial planets with rock, ice, and inorganic and organic compounds, gaseous planets with complex inorganic and organic compounds, and terrestrial planets and gaseous planets that develop complex atmospheres. Moreover, there is the pattern or patterns of the emergence of life on planet Earth (and, in principle, the emergence of life on other planets in the Universe that may sustain life). Thus, the paper proposes an alternative law or principle of multiple patterns in the Universe instead of a single pattern: that there are multiple patterns of the Universe and in this solar system instead of the single pattern of heat death and disorder implied by the negativist theories of the Second Law of Thermodynamics and the Theory of Entropy.

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Submitted: 13.10.2026 **Accepted**: 16.10.2026 **Published**: 28.10.2026

Keywords: Second Law of Thermodynamics, Information, Post-Classical Physics, Classical Physics

Introduction

This paper evaluates the Second Law of Thermodynamics, and seeks to show that the classical theory of the Second Law of Thermodynamics should be evaluated by the standards of "post-classical" physics including the physical and biophysical concepts of information. The Second Law of Thermodynamics implies that "the amount of energy in the Universe always decreases" and that the theory of entropy implies that natural processes tend to a state of disorder. This is shown to be empirically false since stars in the Universe are powered by nuclear explosions, and the nuclear explosions of stars in the galaxies of the Universe increase the complexity of the stars as vast inorganic compounds are produced by the nuclear explosions of the stars in the Universe. Moreover, the planets of solar systems in the galaxies of the Universe, when the planets cool and may generate rock and ice compared to the stars, produce complex inorganic and organic compounds.

Gaseous planets produce complex inorganic and organic compounds. Astrophysicists infer this from light and electromagnetic spectra released from solar systems and galaxies in the Universe, and from the behavior of planets in this solar system. The paper provides additional evaluations of the Second Law of Thermodynamics, and proposes an alternative law or theoretical principle of multiple patterns of this Universe and the solar system instead of the single pattern of heat death and disorder implied by the theories of the Second Law of Thermodynamics and the Theory of Entropy (the multiple patterns of increasing complexity and energy release and capture disconfirm the single pattern of heat death and disorder implied by the Second Law of Thermodynamics and the Theory of Entropy).

Isaac Asimov writes that "the first law of thermodynamics (that is – the law of the conservation of energy) is an essentially optimistic law. Since no energy is destroyed, it might seem that energy is there to be used over and over. Not all energy is equally useful however . . . In a steam engine some of the energy must be lost as heat and so not all of it could be turned into useful work."

In the 19th century the German physicist Julius Emanuel Clausius attempted to develop and formulate the Second Law of Thermodynamics: Clausius "found that this was true of energy conversion: some energy was always lost as heat, and heat could never be converted completely to any other form of energy." Clausius stated that the Second Law of Thermodynamics contains more information regarding the nature of the Universe:

"As a result, the energy supply of the Universe was constantly being degraded to heat, and the amount of useful energy was constantly decreasing." However, in the 19th century, "the energy supply of the Universe" was not measurable or observable by astronomers and physicists, and thus it was not clear if the "energy supply of the Universe was constantly being degraded to heat, and that the amount of useful energy was constantly decreasing." Moreover, how could the "amount of useful energy" be "constantly decreasing" if light and electromagnetic spectra that travel from stars in the Universe to planets in the Universe including planet Earth play a role in the spark of life on planet Earth and the emergence and growth of complex life on planet Earth (& in principle other planets in the Universe that may have the potential for organic life). The "amount of useful energy" is not "constantly decreasing" everywhere in the Universe, since there is more than a single pattern in the Universe, and disorder and decreasing complexity is not everywhere in effect since there is the useful harvesting of light energy by photosynthetic microorganisms and complex plants on planet Earth and the complementary emergence of growth of animal life that consume and harvest the plant and animal life (and these processes in principle may occur elsewhere in the Universe on planets that may sustain organic life).

Google online search states that the Second Law of Thermodynamics "introduces the concept of entropy a measure of disorder or randomness in a system. The second law states that for spontaneous processes, the total entropy of the universe increases. In other words, natural processes tend to move towards a state of greater disorder."

Isaac Asimov states that in the 19th century, Clausius claimed "that if the ratio of the heat content of a system

to its absolute temperature were taken, that ratio would always increase, in any process taking place in a closed system. Under perfect conditions, it might remain constant, but it would never decrease." However, Isaac Asimov was unsatisfied by the concept and theory of Entropy: "Clausius gave this ratio the name entropy for some obscure reason."

The conception of the "perfect conditions" of the closed system is metaphysical in nature, and does not yield useful predictions or empirical implications since, as suggested, these predictions and empirical implications are negativist on the nature of life on planet Earth or other potential life on planets in the Universe. The emergence of life, microorganisms and complex multicellular life, and the increasing complexity of life over billions of years of evolution including large organisms such as human beings or Homo Sapiens that have more than 200 cell lines and classifications, contradicts the "so-called" theory of entropy.

Clausisus stated that the Second Law of Thermodynamics implied that "the amount of energy in the Universe always decreases." This is empirically false since stars in the Universe are powered by nuclear explosions, and the nuclear explosions of stars in the galaxies of the Universe increase the complexity of the stars as vast inorganic compounds are produced by the nuclear explosions of the stars in the Universe. Moreover, the planets of solar systems in the galaxies of the Universe, when the planets cool and may generate rock and ice compared to the stars, produce complex inorganic and organic compounds. Gaseous planets produce complex inorganic and organic compounds. Moreover, the planets may generate complex atmospheres of gas and clouds.

Astrophysicists can infer this from light and electromagnetic spectra released from solar systems and galaxies in the Universe, and from the behavior of planets in this solar system. The Hubble telescope and Cassini spacecraft have discovered that inorganic and organic compounds are available on Mars and every planet in this solar system, including Mercury, Venus, Jupiter, Saturn, Neptune, Uranus, & Pluto. Diamond crystals, another complex organic compound, are hypothesized to form on Neptune.

Google online search states that the "classic example" of the Second Law of Thermodynamics is heat flow from a hot object to a cold object. The heat spontaneously flows, causing the hot object to become colder and the cold object to become warmer, increasing the overall disorder (entropy) of the system." Is this an accurate statement on the nature of the physical world and the Universe, since stars in the Universe produce and generate nuclear explosions resulting in the release of heat, light, and electromagnetic spectra, and for most of the lifespans of stars in the galaxies in the Universe, the stars do not grow or emerge as increasingly cold or colder objects, but release heat, light, and electromagnetic spectra generated by their nuclear explosions.

There is the Empiricist and positivist nature of science versus the non-empirical, metaphysical, and negativist statement of the Second Law of Thermodynamics that, if the Second Law of Thermodynamics has empirical implications, it is empirically wrong. The negativist conception and statement of the Second Law of Thermodynamics and the negativist Theory of Entropy assume that there is only a single pattern of the Universe, heat death and disorder. However, there are multiple patterns in the Universe and this solar system including patterns that contradict the Second Law of Thermodynamics and the Theory of Entropy: these include the nuclear explosions of stars that produce increasing complexity and inorganic compounds, the cooling of planets that produce terrestrial planets with rock, ice, and inorganic and organic compounds, gaseous planets with complex inorganic and organic compounds, and terrestrial planets and gaseous planets that develop complex atmospheres. There is also the pattern or patterns of the emergence of life itself on planet Earth (and, in principle, the emergence of life on other planets in the Universe that may sustain life).

Thus, perhaps there should be recognized an alternative law or theoretical principle of multiple patterns in the Universe instead of a single pattern: that there are multiple patterns in the Universe and this solar system instead of the single pattern of heat death and disorder implied by the negativist theories of the Second Law of Thermodynamics and the Theory of Entropy. The multiple patterns described earlier including increasing

complexity in inorganic and organic compounds of stars and planets, energy release of stars and potential energy capture and harvesting of light energy by photosynthetic life on planet earth (and other planets that may sustain life) and of the complexity of the expressions of different wavelengths of light, information, and electromagnetic spectra given off by stars in the Universe, are all patterns that disconfirm the single pattern of heat death and disorder implied by the Second Law of Thermodynamics and the Theory of Entropy.

Clausisus stated that the Second Law of Thermodynamics implied that entropy "will someday reach a maximum when no useful energy is left and disorder is total." This is negativist metaphysics (like a metaphysical version of Spengler's negativist theory of the Decline of Western Civilization or Nietzsche's negativist proclamation that "God is Dead" that coincided with the growth of the industrial economy of the United States or the international success of the British Empire in the 19th century). Since this statement or version of the Theory of Entropy is preposterous in its negativist nature instead of being empirical and positivist, it is arguably not scientific in nature. As Wolfgang Pauli and Peter Woit would state, this formulation of the Theory of Entropy is "not even wrong!" The Second Law of Thermodynamics of classical physics and the Theory of Entropy may be viewed in a similar way to the near universal acceptance of the "aether" through the 19th and early 20th centuries in physics and astronomy: as metaphysical conceptions of earlier science that may be discarded by physical theory and the practice of day-to-day physics and astronomy.

Moreover, the Second Law of Thermodynamics of "classical physics" may be evaluated from the standpoint of the "post-classical" science of complexity of the 20th and 21st century, including complexity theorists. The science of complexity recognizes that there is the causation, "self-organization," and emergence of complex physical molecules of inorganic and organic compounds in this solar system, on this Planet, and elsewhere in the Universe. The causation and existence of complex physical molecules of inorganic and organic compounds emerge independent of microorganisms and complex multicellular life (that scientists infer existed before the emergence of microorganisms and multicellular life billions of years ago on planet Earth). Moreover, from the standpoint of complexity theory, the emergence of complex cellular organic life including complex organisms with hundreds of cell lines contradicts the implications of Entropy theory.

Acknowledgements

The author declares an interest as CEO of CIA Design & CEO of Deep Space Exploration. The author thanks the reviewers for their comments. The author would like to retain © Copyright under a Creative Commons 2.0 © Copyright license or 4.0 license.

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