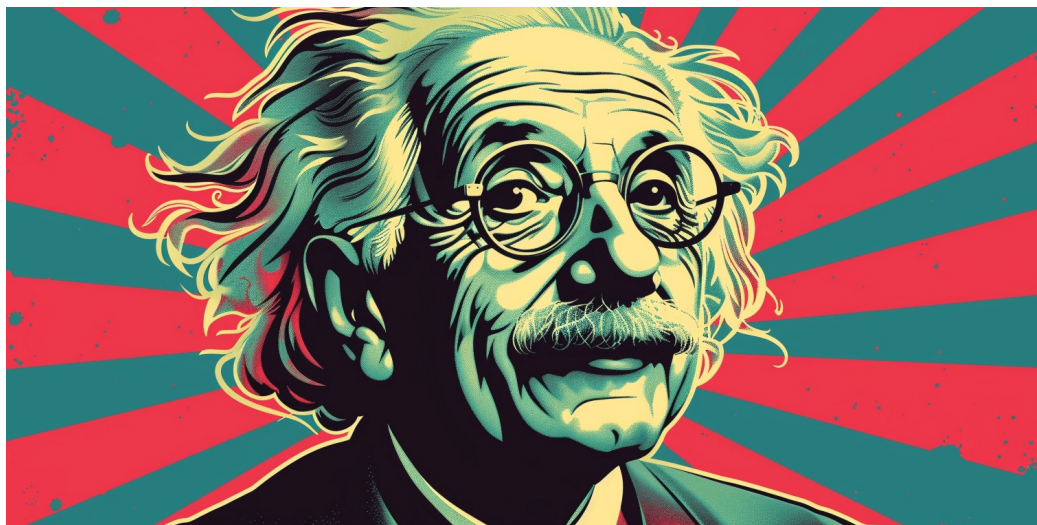


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# Understanding General Relativity and Gravity Through the Heaven/Earth Framework— A Yijing Perspective

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## Abstract

The relationship between modern science and metaphysics has been challenging due to the different ontological and epistemological perspectives they are based on. However, the challenge is mainly attributable to modern science's empirical attitude. This paper draws on Einstein's 1915 theory of relativity and *Yijing's* cyclical principles, conceptualized at least four thousand years (circa 2000 BCE), to gain a new understanding of gravity from a social science standpoint. *First*, *Yijing's* origins can be traced back to the mythical figure *Fu Xi*, who created the eight trigrams and 64 hexagrams. *Second*, King Wen and the Duke of Zhou wrote about the hexagrams in greater detail during the 11th century BCE. The third intellectual addition and augmentation happened between the 5th and 2nd century BCE, incorporating seven writings collectively known as the 'Ten Wings'. These writings provided a framework for understanding the universe's complexities and underlying patterns, including an implication of gravity acting on all beings, things, and events, though not explicitly mentioned as gravity.

The paper introduces Einstein's theory of relativity as a mechanism and correlates it with *Yijing* principles and precepts to provide perspectives valuable to the social and academic community. One of *Yijing's* central features is its use of *yin-yang* correlative cosmology, which involves the idea that all things in the universe are interconnected and

interdependent, each possessing *yin* and *yang* energies that are constantly in flux and transformation, continually shifting in field-like fluctuation. The hexagram matrix is a system of symbols, archetypes, and concepts which constitute a map that classifies and analyses reality through the eyes of the observer.

Einstein's theory of relativity revolutionized cosmology and conceptualised space, time, mass, gravity, and energy. The theory concerns the relative velocity or acceleration of a frame of reference with respect to a stationary frame of reference. The approach encompasses the two interconnected theories of special and general relativity, with general relativity establishing an essential association between time and space and relating to the structure of spacetime and wave-like fluctuation where the presence of matter and energy causes curvature of spacetime.

The paper acknowledges that some may view the attempt to link *Yijing* with modern sciences-related themes with scepticism since the links rest on allegorical associations. However, this paper aims to mirror Einstein's central principles of the theory of relativity into a social inquiry of *Yijing*.

This paper provides novel and diverse perspectives using the heaven and earth framework, contributing significantly to comprehending the interconnected dynamics of *qi*, space, and time within *Yijing*.

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## Introduction

Western physics and natural sciences underwent a significant transformation due to two notable theories, namely Albert Einstein's theory of relativity and quantum mechanics. These theories emerged in the early decades of the twentieth century and brought about crucial changes in comprehending the concepts of space, time, and causality. The special and general theories of relativity demonstrate that the conventional notion of space and time as an absolute backdrop for all phenomena was inaccurate, as they are relative and contingent upon the observer's position and velocity. The principles of quantum mechanics were particularly challenging to comprehend, as some of its postulations contradicted everyday experiences and common sense. In particular, it revealed that the nature of light and matter is significantly more intricate than previously assumed, given that both had a dual nature and could be interpreted as either particles or waves but not simultaneously as both.

*In spite of these far-reaching changes, Newtonian mechanics at first held its position as the basis of all physics.*

*Maxwell himself tried to explain his results in mechanical terms, interpreting the fields as states of mechanical stress in a very light space-filling medium, called ether, and the electromagnetic waves as elastic waves of this ether. This was only natural as waves are usually experienced as vibrations of something; water waves as vibrations of water, sound waves as vibrations of air. Maxwell, however, used several mechanical interpretations of his theory at the same time and apparently took none of them really seriously. He must have realized intuitively, even if he did not say so explicitly, that the fundamental entities in his theory were the fields and not the mechanical models. It was Einstein who clearly recognized this fact fifty years later when he declared that no ether existed and that the electro- magnetic fields were physical entities in their own right which could travel through empty space and could not be explained mechanically.<sup>1</sup>*

The special theory of relativity is a theory proposed by Albert Einstein in 1905 describing the laws of physics in a highly deterministic way, congruent with Newtonian classical physics. The theory is based on two postulates: (1) The laws of physics are the same for all observers moving at a constant velocity relative to each other, and (2) The speed of light is always the same, regardless of the motion of the observer or the source of the light. From these postulates, Einstein derived several key results, including time dilation, length contraction, and the equivalence of mass and energy (famously expressed as  $E=mc^2$ ).

The general theory of relativity, which was subsequently developed by Einstein in 1915, extends the principles of special relativity to include gravity.<sup>2</sup> In general relativity, gravity is not a force but rather a curvature of spacetime caused by the presence of matter and energy. In general relativity, space and time are inseparable. Capra concurred:

*Since space can never be separated from time in relativity theory, the curvature caused by gravity cannot be limited to three-dimensional space, but must extend to four-dimensional space-time, and this is, indeed, what the general theory of relativity predicts. In a curved space-time, the distortions caused by the curvature affect not only the spatial relationships described by geometry but also the lengths of time intervals. Time does not flow at the same rate as in 'flat space-time', and as the curvature varies from place to place, according to the distribution of massive bodies, so does the flow of time. It is important to realize, however, that this variation of the flow of time can only be seen by an observer who remains in a different place from the clocks used to measure the variation. If the observer, for example, went to a place where time flows slower, all her clocks would slow down too, and she would have no means of measuring the effect.<sup>3</sup>*

On September 14, 2015, a monumental achievement was made in astrophysics when ripples in the fabric of spacetime, known as gravitational waves, were detected for the first time.<sup>4</sup> This groundbreaking discovery confirmed a major prediction of Albert Einstein's general theory of relativity and opened up a new and unparalleled window into the cosmos. In addition, the observed gravitational waves provided crucial information about their source and the nature of gravity that could not be obtained otherwise. According to physicists, the gravitational waves were generated during the final moments of the merger of two black holes, creating a more massive spinning black hole.<sup>5</sup> The detection of the gravitational wave signal from the binary black hole coalescence, which had been previously predicted but never

observed, was detected by both of the twin Laser Interferometer Gravitational-wave Observatory (LIGO) detectors, located in Louisiana and Washington, USA.<sup>6</sup>

The idea of a wave-like flux or fabric is a metaphor that has been used in various ways to describe the behaviour of the physical world, including the effects of gravity described by the theory of general relativity. In general relativity, gravity is understood as the curvature or warping of spacetime rather than as a force that acts across a distance. This curvature can be thought of as the 'fabric' of spacetime, which is affected by the presence of massive objects. Gravitational waves are ripples in the fabric of spacetime caused by the acceleration of massive objects. They are analogous to waves on the surface of a pond, spreading out from a disturbance and carrying energy away from it.

The metaphor of a fabric or wave-like flux suggests a continuous, dynamic process of deformation and transformation in which the curvature of spacetime varies in response to the distribution of mass and energy. This curvature variation can produce a range of phenomena, such as the bending of light by gravity, the precession of planetary orbits, and the behaviour of black holes. In order to describe and analyse these phenomena mathematically, the theory of general relativity uses the concepts of differential geometry and tensor calculus. These mathematical tools allow physicists to model the behaviour of spacetime as a continuous, four-dimensional geometry, which can be described by a set of equations known as the Einstein field equations.

The metaphor of a wave-like flux or fabric conveys the dynamic, continuous nature of the physical world and the way that gravitational effects arise from the curvature of spacetime. However, it is essential to remember that this is just one way of understanding the complex and abstract concepts involved in the theory of general relativity. Moreover, the mathematical formalism used to describe these concepts is technical and challenging to grasp.

*Yijing* describes the patterns of change in the universe. It contains many references to cycles, such as the cycles of the seasons, the phases of the moon, and the patterns of human life (Figure 1). These cycles are often described as the interplay between opposing forces, such as *yin* and *yang* constituting the energy or *qi*.

*For this reason in change there is Supreme Polarity [taiji ], which generates the Two Modes. The Two Modes generate the Four Images, and the Four Images generate the Eight Trigrams. The Eight Trigrams determine the auspicious and ominous; the auspicious and ominous generate the Great Undertaking.<sup>7</sup>*

. The concept of the Supreme Polarity (*taiji*) as the source for all activities, and the idea of activity as fluctuation and transformation, are fundamental concepts in Chinese philosophy and cosmology. However, it is important to note that these concepts are expressed through metaphorical language and imagery, and their precise meanings and interpretations vary depending on context and philosophical tradition. Thus, the activity of the Supreme Polarity is a metaphorical description of the dynamic interplay between the complementary and opposing principles of *yin* and *yang*. The metaphor of a bouncing wave describes the fluctuating and transforming nature of the interplay between *yin* and

*yang*, which characterizes the continuous process of change and transformation represented by the hexagram. This metaphor captures the essence of the dynamic balance between opposing forces and the constant movement and transformation that characterizes the world. The hexagram represents a constantly changing substate, and the wave metaphor emphasises this transformation's continuous nature. The concept of change and transformation is central to the understanding of *Yijing*, and the metaphor of the bouncing wave provides a vivid illustration of the dynamic nature of this process.

Jung opined “that the hexagram worked out in a certain moment coincided with the latter in quality no less than in time. To Jung, the hexagram was the exponent of the moment in which it was cast—even more so than the hours of the clock or the divisions of the calendar could be—inasmuch as the hexagram was understood to be an indicator of the essential situation prevailing in the moment of its origin”.<sup>8</sup> Essentially, the hexagram is a symbolic representation of the energy or essence of the moment, and therefore holds great significance for interpreting and understanding the situation at hand, and it is Jung’s synchronicity<sup>9</sup> that “takes the coincidence of events in space and time as meaning something more than mere chance, namely, a peculiar interdependence of objective events among themselves as well as with the subjective (psychic) states of the observer or observers”.<sup>10</sup> According to Jung,

*The microphysical event includes the observer just as much as the reality underlying the I Ching comprises subjective, i.e., psychic conditions in the totality of the momentary situation. Just as causality describes the sequence of events, so synchronicity, to the Chinese mind, deals with the coincidence of events. The causal point of view tells us a dramatic story about how D came into existence: it took its origin from C, which existed before D, and C in its turn had a father, B, etc. The synchronistic view, on the other hand, tries to produce an equally meaningful picture of coincidence. How does it happen that A', B', C', D', etc., appear all in the same moment and in the same place? It happens in the first place because the physical events A' and B' are of the same quality as the psychic events C' and D', and further because all are the exponents of one and the same momentary situation. The situation is assumed to represent a legible or understandable picture.<sup>11</sup>*

The appearance of a convergence of events or relations all ‘in the same moment and in the same place’ is about synchronicity, which depends on ‘the subjective (psychic) states of the observer or observers’. Jung’s synchronicity weaves concepts like meaning, probability, causality (or better, acausality), and time. Jung defined synchronicity in terms of simultaneity, deriving the concept from the Greek words for ‘together’ (syn) and ‘time’ (chronos).<sup>12</sup> However, the association between synchronicity and simultaneity is misleading since it has to be understood in the context of the psychic relativity of space and time at the material time when the convergence of events or relations occurs. The notion of the psychic relativity of space and time has to account for actual coincidences where the component events and relations are simultaneously present within the observer’s field of perception, as well as for simultaneity implicating the events and relations (intuitively perceptible<sup>13</sup>, before happening) that are widely separated in time and space. Conway, Repke, and Houck discussed psychological spacetime concerning the Relativity Theory of time perception.<sup>14</sup>

*The intimately woven bond between space and time—a relationship so entrenched that it is referred to by*

*physicists as a single entity called **spacetime**—has been an accepted scientific fact for generations of scientists. Repeated tests have confirmed empirically that time is not the static entity that Newton imagined it to be; rather, in line with the theory of relativity, motion and gravity not only affect space but also simultaneously affect time. Time in reality slows up and slows down for each observer based on their movement through spatial dimensions in highly predictable ways.<sup>15</sup>*

In modern physics, the concept of time and motion is, therefore, relative to the observer (and the subjective psychic state of the observer). Since the theory of relativity describes how the motion of objects is affected by the curvature of spacetime, this paper argues that this curvature is caused by the presence of matter and energy, which warp the fabric of space and time around them. Gravity is crucial to cause systems to be unstable or unbalanced, thus resulting in fluctuating the fabric of spacetime. “Spacetime is composed of a fluctuating arrangement of bubbles or loops called spacetime foam, or quantum foam<sup>16</sup>.”<sup>17</sup> Quantum foam is believed to be influenced by gravity. The concept of quantum foam arises from attempts to reconcile quantum mechanics, which describes the behaviour of subatomic particles, with general relativity, which describes the behaviour of gravity on a large scale. According to general relativity, gravity arises from the curvature of spacetime, which is affected by the presence of massive objects. In turn, the curvature of spacetime affects the behaviour of particles and fields within it. At very small scales, however, the curvature of spacetime becomes highly uncertain due to the energy fluctuations predicted by quantum mechanics. Therefore, quantum foam is influenced by gravity at the smallest scales, where the curvature of spacetime is most uncertain. Quantum mechanics and the fluctuations of energy associated with quantum foam can have profound implications for the behaviour of matter and energy at the smallest scales.<sup>18</sup>

*The real particles such as electrons, positrons, photons, hadrons etc. as well as all macroscopic bodies are quantum wave-like excitations of this medium endowed with certain quantum numbers ensuring their relative stability. According to the Standard Model, the physical vacuum can be characterized by a total vacuum energy density which has at least the following three contributions: the fluctuations characterizing the zero-point field, the fluctuations characterizing the quantum chromodynamic level of sub-nuclear physics, and the fluctuations linked with the Higgs field.<sup>19</sup>*

This paper argues that matter and energy refer to *qi*, “an energy-substance that constitutes everything in the cosmos, including thoughts and emotions. While the idea obviously does not come from physics, there is not a lot of difference between describing everything as being made of *qi* and everything as being made of matter and energy<sup>20</sup>—the scientific understanding of matter and energy centres on the fundamental laws of physics and their interactions. Matter is composed of atoms and subatomic particles, while energy is the capacity of matter to perform work. In contrast, *Yijing*’s metaphysical notion of *qi* encompasses a broader spectrum of phenomena, including human consciousness and spiritual energy. However, despite the apparent differences, the effects of matter and energy on *qi* fluctuations are discernible. Gravity, for instance, exerts a force on matter, causing it to fluctuate in a particular direction (or warping the fabric of space and time around matter and energy). Similarly, this paper posits that *qi* is influenced by the same gravitational pull exerted

by *kun*, leading to fluctuations and changes in its flow. As Cheng argued, the temporal form is a result of the fluctuation, characterised as a certain hexagram

*But how one is to characterize this important tradition becomes itself a hermeneutical issue, because our understanding of what constitutes a hermeneutical understanding is hermeneutical, that is, subject to different interpretations. But we can see these interpretations are founded on some underlying model of understanding of reality and truth. Perhaps it is in the nature of interpretation and understanding that an appeal to an understanding of reality and truth is always made. This understanding of reality and truth is thus simultaneously the source of meaning and the driving force for seeking understanding. Without such a reference, no understanding and interpretation can be made.<sup>21</sup>*

Therefore, while the scientific understanding of matter and energy may differ from the metaphysical notion of *qi*, their effects on the universe are intertwined and can be observed in their influence on *qi*. To sum up, this paper draws the connection among *qi*, energy, matter, and gravity, as presented in the *Yijing* literature, particularly the judgement and image commentaries. Despite the divergence between scientific interpretations of energy and matter and the metaphysical conception of *qi*, their impact on the cosmos is intertwined, and their effect on *qi* can be perceived simultaneously within the observer's field of consciousness, as well as in the relativity of their psyche state. The study concludes that *qi* is infused in all material things on earth and heaven, and its fluctuations are influenced by the weak gravity that attracts all matter to the earth. This paper contends that the effects of this weak gravity on *qi* fluctuations are significant and, therefore, merit further investigation.

## Between Heaven and Earth

The Supreme Polarity [ *taiji* ] exists between heaven and earth and is the source for all activities (Figure 1). 'Activity' is fluctuation and transformation.<sup>22</sup> Under the Treatise on the Appended Remarks ( *xici zhuan*) translated by Adler:

*For this reason, closing the door is called **Kun**; opening the door is called **Qian**; alternately closing and opening is called fluctuation [**bian** ]; going and coming without end is called continuity [**tong** ]. What is seen is called an image; what has shape is called an implement; what is used systematically is called a pattern [**fa** ]. Putting it to good use in all situations, so that all people use it, is called spirit.<sup>23</sup>*

The interplay of *yin* and *yang* in the above passage can be metaphorically described as a wave-like fluctuation. Just as waves oscillate up and down, the forces of *yin* and *yang* alternate unpredictably, giving rise to different substates or 'images' represented by the hexagram. When these images take shape, they become tangible and usable, like an implement or an artefact. This can be thought of as the crest and trough of a wave, where the crest represents the

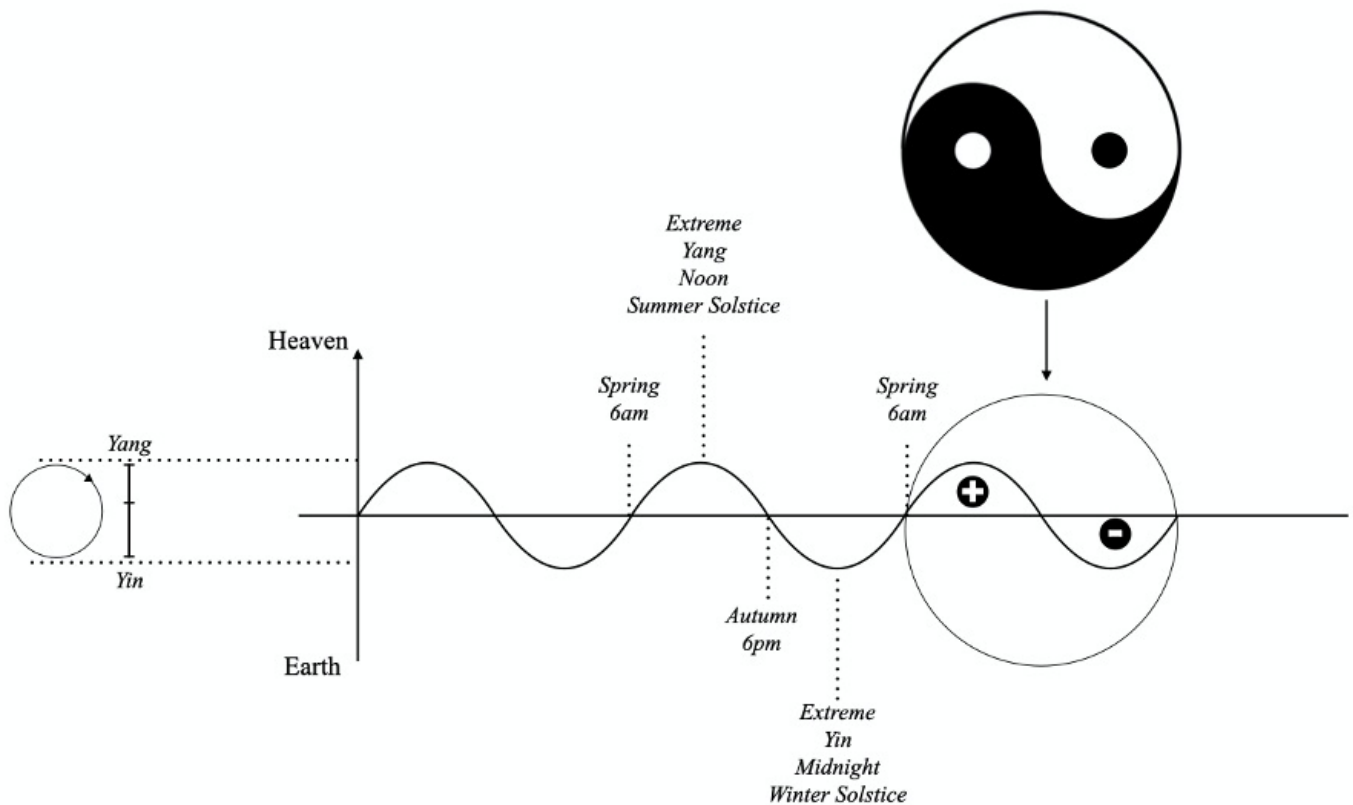
tangible manifestation of the image, and the trough represents the potential for the image to transform or fluctuate into something else. Furthermore, the passage describes the importance of interpreting these images in different situations. This can be seen as how a wave can be interpreted differently depending on the context in which it appears. Observation (also represented in the *guan* hexagram) is subjected to the (psychic) states of the observers to form the 'macro-phenomenal point of view'. Cheng discussed the *guan* hexagram.

*In the **guan** hexagram, observation is conceived as an enlarging and therefore an open process from which **yin** and **yang** may be observed. It is a process of moving from a smaller scope of observation to a larger scope of observation, from observing what happens in one's own life to what happens in the life of man in general. As I have discussed in my essay on **Guan**, **guan** forms the foundation for understanding the whole system of changes in nature, and it also provides an orientation from which one may determine and come to know a system of positions in which the observer is located. Not only does the world come to be known as a system of changes, we come to see also how the world changes and how things change in the world. **Guan** is comprehensive and non-reductive and therefore preserves the natural scene of reality from a truly macro-phenomenal point of view.<sup>24</sup>*

The wave metaphor is a powerful way to describe the interplay of *yin* and *yang* in the passage. It captures these forces' unpredictable and transformative nature and how they give rise to tangible and usable images. These tangible and usable images are the objects of *guan*. Adler explained: "Seeing images and shaping implements are the order of how things are generated. A 'pattern' [or model] is what is made when a Sage cultivates the Way, and 'spirit' is the common people's natural daily use of it, and shaping implements are the order of how things are generated. A 'pattern' [or model] is what is made when a Sage cultivates the Way, and 'spirit' is the common people's natural daily use of it."<sup>25</sup>

In another context, the metaphor of 'spirit' as a wave can be understood as the underlying energy that animates all things and gives rise to the fluctuation and transformation described in the passage. This 'spirit' is not tangible but a metaphorical representation of the fundamental force underlying all existence. The texts also emphasize the importance of interpreting the images and forms that arise from this dynamic in different situations under heaven (between heaven and earth). This is seen as the key to putting the energy of the 'spirit' to good use. The metaphor of 'spirit' as a wave captures the dynamic and transformative nature of this interplay while emphasizing the importance of interpreting and using this energy systematically and productively.





**Figure 1.** Cycles, phases, and seasonality

The principle of change, when examined superficially, appears to have no substance. When approached without a systematic methodology, the principle of change also appears to lack structure. The interplay of *yin* and *yang* underlines the understanding of the principle of change as a fundamentally intangible concept. This interplay of *yin* and *yang* is manifested in the movements of the sun, moon, and stars, in the progression of day and night, and the cycles of cold and heat.

Summarising, everything under Heaven and Earth alternates *yin* and *yang*; the fluctuation going and coming ceaselessly. What is seen is called an image; what has shape is called an implement; what is used systematically is called a pattern [*fa*]. The passage highlights the concept of continuity [*tong*], which refers to the unending fluctuations and transformations that occur under heaven and earth. These fluctuations and transformations are observed, giving rise to images, implements, and patterns. By putting them to good use in all situations, Sages tap into the spirit, which is a fluctuating wave. Observation is the key to understanding the changes in nature and one's position within them. Through observation, one can comprehend the pattern of natural changes and see how the world and things change within it. The concept of *guan* is highlighted as a comprehensive and non-reductive way of understanding the natural scene of reality from a macro-phenomenal perspective, preserving its natural complexity.

## Discussion

*Essence [jing ] and qi make things; the hun [yang soul] floating away causes fluctuation [bian ] [death]; in this way he understood the dispositions and circumstances of ghosts and spirits. He encompasses the transformations of Heaven and Earth and does not transgress. He completes all things without omission; he penetrates the Way of day and night and understands it. Therefore spirit has no location and change [yi] has no [fixed] structure.<sup>26</sup>*

The passage describes the relationship between three concepts: *jingqi* (essence and energy), *youhun* (wandering soul), and *guisheng* (ghosts and gods). The *jingqi* is seen as the physical aspect of existence, while the *youhun* is the ever-changing aspect that animates all things. The *guisheng* are seen as beings that embody the qualities of this dynamic force. The metaphor of the *youhun* as a wave emphasizes that this force is not a static entity but a dynamic, constantly changing energy that gives rise to all things. The wave metaphor also suggests that this force moves in a cyclical pattern, with ebbs and flows, highs and lows. The passage also emphasizes the importance of understanding this dynamic force and its manifestations in different situations under heaven (between heaven and earth). The metaphor of the universe as a model for understanding this force suggests that one must not violate the natural order of things but instead follow the universe's path to governing the world.

Additionally, the text emphasizes the importance of being rooted in the earth and compassionate to love and care for all things. The passage suggests that a fundamental force is underlying all existence and that understanding this force and its manifestations (as images) is essential for governing the world through a pattern. Here, this paper argues that this force is gravity, governing the world through a pattern.

*In 1687, Isaac Newton put forth the Universal Law of Gravitation: Each particle of matter in the universe attracts all others with a force directly proportional to its mass and inversely proportional to the square of its distance of separation. Nearly a century later, Pierre Simon, Marquis de Laplace, showed that gravitational attraction obeys a simple differential equation.<sup>27</sup>*

“Newton described gravity as an attractive force between two masses, but Einstein's General Theory of Relativity provides a different explanation. Implicit in Einstein's theory is the idea that gravitational effects are the result of a distortion in the shape of space-time”.<sup>28</sup> Einstein's General Theory of Relativity embodies the fundamental proposition that the influence of gravity arises due to a deformation in the geometry of space-time. John Wheeler's phrase elegantly encapsulated this idea: “Matter tells space-time how to curve, and space-time tells matter how to move”.<sup>29</sup> While it is possible to draw an analogy between the force of gravity and the concept of love in this passage, it is essential to note that the text does not explicitly make this connection. However, this analogy can be explored further. In this passage, love is described as encompassing everything and not exceeding the transformation of heaven and earth, which can be interpreted as a force that permeates all things and is subject to the laws of nature.

While love and gravity may seem like vastly different concepts, they both involve the fundamental force of attraction. The phrase ‘ ’ *qu cheng wan wu er bu yi* implies that this force adapts to the particular form of each individual thing, much

like the way that gravity warps spacetime in response to the mass and energy of objects. The phrase ‘*gu shen wu fang er yi wu ti*’ suggests that this force is boundless and formless, which could be interpreted in terms of the force of gravity, which is present throughout the universe and does not have a specific physical form. The term ‘*yi wu ti*’ can be understood as ‘[yi] has no [fixed] structure’; here, this is interpreted to mean that this force is not something that can be directly observed or measured, but rather a fundamental aspect of the universe that can only be understood through its effects. The analogy between the force of gravity and the concept of love in this passage is a creative interpretation, but it should be noted that the text does not directly compare the two. The main message of the passage is to emphasize the importance of being rooted in the earth, being compassionate, and understanding the dynamic interplay of all things under heaven. In the passage's context, warping the fabric of spacetime can be seen as a metaphor for how love and compassion attract and embrace all things. The text suggests that the earth acts as an attractive fabric that receives energy and matter and then warps around them to embrace them with love. This can be seen as a metaphor for how love and compassion draw all things towards them and encompass everything in their embrace. The text also suggests that being rooted in the earth and compassionate is necessary to love and care for all things. This is because being rooted in the earth represents a connection to the physical world and an awareness of the interdependence of all things. This can be seen as a metaphor for how love and compassion are not tied to any particular form or object but are a fundamental force that permeates all things. The idea that love and compassion are formless suggests that they are not limited by any particular shape or structure but instead are able to flow freely and embrace all things, as illustrated in Figure 2. This is similar to how gravity is formless and pervades all things, exerting force without being tied to any particular object or form.

*Life and growth [sheng sheng ] are the meaning of change. Bringing about images is called Qian; following patterns [fa ] is called Kun. Maximizing numbers to know the future is called prognostication. Penetrating [understanding] the fluctuations is called affairs. When yin and yang are unfathomable, we call it spirit.<sup>30</sup>*

These texts discuss the philosophy of change and the interplay of *yin* and *yang* in the natural world. In particular, they assert that life and growth are the embodiment of change and that the emergence of images is a product of the interplay of *yin* and *yang*. These images are unactualised in heaven but can materialise on earth through the interplay of various resources and the psychic state of the observer. This paper argues that the materialisation of these images depends on how they interact with the spacetime fabric, a manifestation of *yin* and *yang*. The spacetime fabric provides the context within which these images emerge under the force of gravity, and their manifestation is influenced by the resources and the psychic state of the observer. Thus, the interplay of *yin* and *yang* and the emergence of patterns (the uniform weak gravitational force applied to all matter and energy causing the spacetime fabric to warp around the object) contribute to probabilistic outcomes that give rise to the myriad of things, thoughts, and events in the natural world. ‘*yin yang bu ce zhi wei shen*’ is meaning that the fluctuations of *yin* and *yang* are unpredictable and beyond human comprehension and that they give rise to the emergence of patterns that can be seen as divine or miraculous. The concept of *yin* and *yang* is fundamental in Chinese philosophy, representing the complementary and opposing forces in the universe. *Yin* represents

the feminine, passive, and receptive aspects, while *yang* represents the masculine, active, and creative aspects. These two forces are in a constant state of flux, and their interactions give rise to all phenomena in the universe, from the smallest particles to the largest structures. These fluctuations of *yin* and *yang* are merely images unactualised in heaven. In other words, they exist as potentialities waiting to be realised in the material world. However, for these images to materialise, there must be a pattern, a structure that provides a framework for their manifestation. This pattern is represented by the hexagram *kun*, which signifies following patterns or laws.

The probability wave function associated with a gravitational wave describes the probability of finding a particle at a particular location in space and time, given the curvature of spacetime caused by the massive object. When the fabric of spacetime wraps and warps, it affects the probability of the emergence (of a reality, actualisation) at any given location in time.

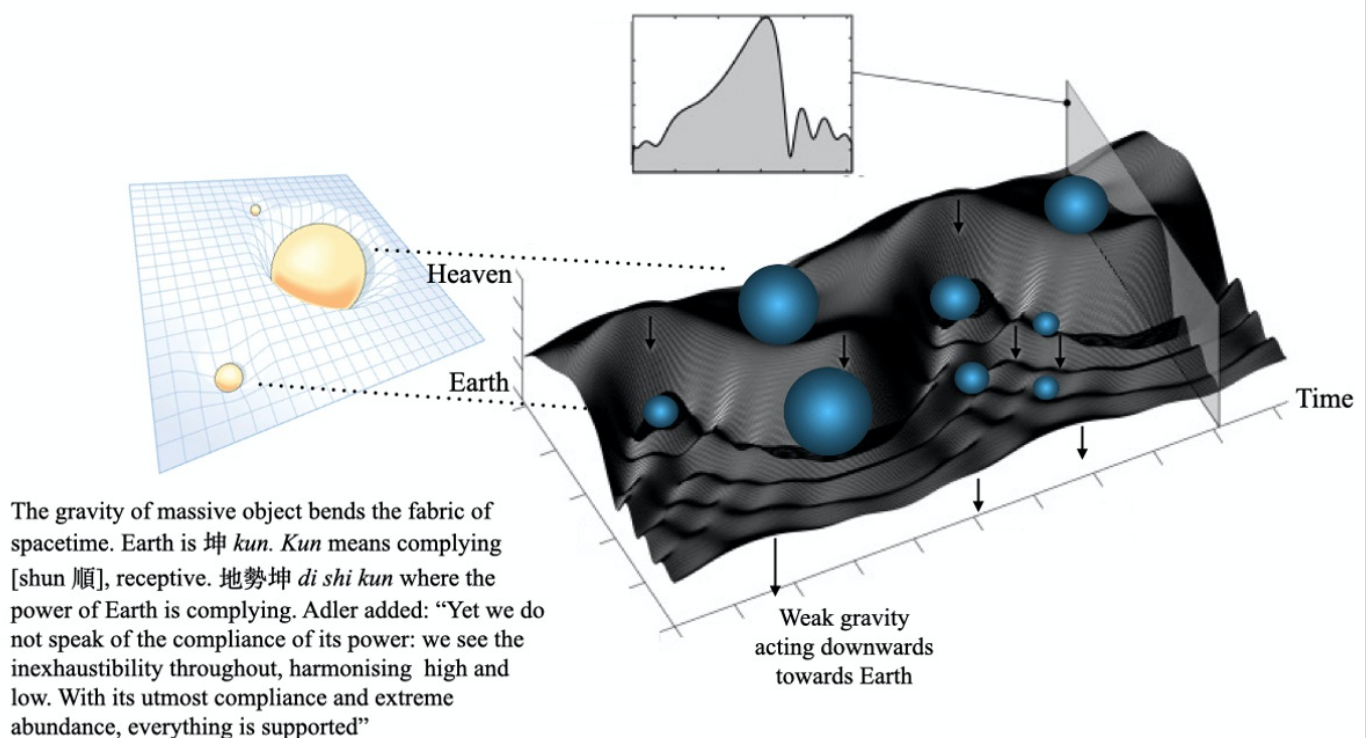


Figure 2. Warping of spacetime fabric and gravity.<sup>31</sup>

Contemporary scientific inquiry actively explores the concept of quantum gravity alongside ghost-free gravity, which denotes a specific category of modified gravity theories aimed at addressing shortcomings associated with conventional General Relativity.<sup>32</sup> “Currently, these issues bring into question the phenomenology of the Einstein equations applied to large scales, and they also challenge the effective field theory approach to QFT. Since the Einstein equations connect the matter content with gravity, there are two potential paths: either modifying gravity or changing the quantum-matter sector”.<sup>33</sup>

The term ‘ghosts’ refers to negative kinetic energy particles that generate instabilities, resulting in unpredictability within the gravitational theory.<sup>34</sup> Ghost-free gravity models function by altering the action of gravity to eradicate these negative entities while remaining consistent with empirical observations. Such models often necessitate the introduction of supplementary fields or higher derivative terms in the action, which can modify gravity’s behaviour at either minor or major scales. Examples of ghost-free gravity theories include massive gravity<sup>35</sup>, bimetric gravity<sup>36</sup>, and the Horndeski theory<sup>37</sup>. Notable contributions to the development of various ghost-free gravity models have been made by researchers such as de Rham, Gabadadze, and Tolley, who have worked on massive gravity, as well as Hinterbichler and Rosen, who have focused on bimetric gravity.<sup>38</sup> Horndeski has also made notable contributions to this field through his work on a class of scalar-tensor theories free of ghosts.<sup>39</sup> It is crucial to note that ghost-free gravity models remain an active area of research, with novel models and modifications constantly being proposed and tested.

The term ‘ghosts’ in the context of gravity refers to negative kinetic energy particles that introduce instabilities and unpredictability in the theory of gravity. These ghosts are seen as problematic since they lead to inconsistencies within the theory. In contrast, the use of concepts like ‘spirits’, ‘ghosts’, and ‘gods’ in Chinese philosophy, as seen in *Yijing*, is a way to describe energies that are not directly observable but are believed to play a role in the manifestation of physical reality. Here, the terms ‘spirits’, ‘ghosts’, and ‘gods’ represent various forms of energy, such as *qi* or cosmic energy, which are considered fundamental to the universe. The difference between the two lies in the fact that the ghosts in gravity are a theoretical construct due to the limitations of our understanding of gravity. They are problematic because they lead to instabilities and unpredictability within the theory.

On the other hand, the use of ‘spirits’, ‘ghosts’, and ‘gods’ in *Yijing* is a philosophical concept that attempts to explain the underlying principles that govern the universe. These concepts are not based on any observable physical phenomena but are instead used to describe fundamental energies that are believed to influence the physical world, reality, and manifested phenomena. The similarity between the two is that both ghosts in gravity and the ‘spirits’, ‘ghosts’, and ‘gods’ in *Yijing* refer to energies that are not immediately observable but are believed to play a role in the workings of the universe. In both cases, these energies are considered fundamental to the underlying principles that govern the universe, albeit in different ways.

In modern physics, we understand that the universe operates probabilistically. Events do not have predetermined outcomes but rather the probabilities of different outcomes depending on the initial conditions of the system and the laws that govern its evolution. This idea of probabilistic emergence is consistently expressed in the *Yijing*.

*(suo le er wan zhe, yao zhi ci ye. Shigu, junzi ju ze guan qi xiang, er wan qi ci; dong ze guan qi bian, er wan qi zhan)*  
The statement in the *xici* describes the enjoyment and playful interpretation of divinatory symbols, specifically the lines or *yaos* that compose the hexagrams in *Yijing*. The Sages observe the physical forms and appearances of the symbols and enjoy interpreting their meanings. When events occur, the Sages observe how the symbols change and enjoy interpreting their divinatory significance, rooted in the understanding that events do not have predetermined outcomes but rather probabilities of different outcomes depending on the initial conditions of the system and the laws that govern its evolution. In essence, the divinatory symbols are means to access the universe’s underlying laws and understand how

they are constantly transforming. The passage suggests that there are probabilistic outcomes through patterns, depending on how they materialise on earth. In other words, the actualisation of a particular image depends on the conditions in which it is realised and how it is observed, including the spacetime fabric and the other resources available.

Moreover, the psyche state of the observer can also influence the probabilistic emergence of an image. This idea is similar to the observer effect<sup>40</sup> in quantum mechanics, where the act of observation affects the behaviour of the observed system. The observer's psyche state could affect the conditions in which an image is realised, leading to different probabilistic outcomes. The phrase ' ' can be interpreted as meaning that the unpredictable fluctuations of *yin* and *yang* are the essence of the divine. The concept of *yin* and *yang* and the process of change in *Yijing* suggests that the universe operates probabilistically and that the actualisation of a particular image depends on the conditions in which it is realised, including the spacetime fabric and the observer's psyche state. These ideas have parallels in modern physics, and they suggest a fundamental interconnectedness between the physical and mental aspects of the universe. The phrase ' ' invites us to contemplate the mystery and unpredictability of the universe and to embrace the divine essence of change through the Heaven and Earth framework (Figure 2 showing the probabilistic wave generated by the warping process).

*qian* is Heaven, characterized by creativity, activity, and masculinity, and *kun* is Earth, representing the receptive, embracive, passive, accommodative, and feminine principles. The Earth exerts the force of gravity on objects.

"Gravitational fields are created and felt by all massive bodies, and the resulting forces are always forces of attraction".<sup>41</sup> Figure 2 illustrates how Earth's gravitational fields receive and wrap all massive bodies and energies and explains *kun*'s receptive nature.

The concept of Earth's gravitational field as an embracive and accommodative force can be linked to Einstein's theory of general relativity. In this theory<sup>40</sup>, gravity is not seen as a force but as a curvature of spacetime caused by the presence of massive objects. This curvature influences the motion of other objects in the vicinity, causing them to move towards the massive object. So, in a way, the Earth can be seen as creating a curvature in spacetime that draws other objects towards it, much like how *kun* is described as a force that receives and wraps all massive bodies.

Similarly, the concept of quantum gravity can also be related to *kun*'s properties of accommodation and reception. Quantum gravity seeks to unify the two most fundamental forces in the universe, gravity and quantum mechanics. This theory suggests that gravity arises from the interaction between particles and that spacetime comprises tiny particles called gravitons.<sup>42</sup>

Finally, the concept of ghost-free gravity also aligns with *kun*'s properties. Ghost-free gravity is a theory that seeks to remove 'ghosts' or negative energy states from the equations that describe gravity. These negative energy states can cause instability in the theory and lead to inconsistencies. By removing them, the theory becomes more stable and consistent. In the same way, *kun*'s receptive and accommodating properties can be seen as eliminating negative energies or 'ghosts' from the universe, allowing for greater stability and balance. The properties of *kun* as an embracive and accommodative force can be linked to concepts in physics such as general relativity, quantum gravity, and ghost-free gravity. These theories seek to explain the fundamental nature of the universe and its interactions, and the properties of

*kun* can be seen as playing an essential role in these interactions.

However, while *Yijing* describes the interplay of opposing forces in terms of cycles and patterns, the theory of relativity uses mathematical equations to describe the curvature of spacetime and the effects of gravity.

One key difference between the *Yijing* and the theory of relativity is their approach to describing the world. The *Yijing* uses metaphorical language and symbolic imagery to convey its ideas, while the theory of relativity relies on precise mathematical models and empirical observations. However, both approaches seek to understand the patterns and cycles of the universe and our place within it.

Adler explained in the Treatise on the Appended Remarks ( *xici zhuan*): “It is through ease and simplicity that one grasps the order/principle of all under Heaven. Having grasped the principles of all under Heaven, one has achieved one’s position within it”.<sup>43</sup>

## Conclusion

While detecting gravitational waves is a significant breakthrough for studying gravity and the nature of space and time, it is important to note that it is only the beginning of a new era of observation and exploration. The findings do not entirely solve the gravity problem, which remains a significant challenge for physicists. “Gravity is the one force of Nature that operates everywhere; it controls the effects of all the other forces wherever they act”.<sup>44</sup>

The concept of *kun* in Chinese philosophy represents the Earth and is characterized by receptivity, passivity, and accommodation principles. Similarly, gravity is a fundamental force of nature experienced by all massive bodies in the universe. This force of attraction is created by the gravitational fields generated by these massive bodies, which are felt by all other bodies in their vicinity. In this sense, the Earth’s gravitational fields can be thought of as embodying the *kun* principle, as they receive and wrap all massive bodies and energies; such are the patterns of Earth “following patterns [*fa* ] is called *Kun*”.<sup>45</sup>

Einstein’s theory of general relativity provides a mathematical framework for understanding the behaviour of gravitational fields. According to this theory, massive objects warp the fabric of spacetime around them, creating a curvature that other objects follow. This curvature is perceived as the force of gravity. The theory of general relativity has been extensively tested and verified through various observations and experiments.

In terms of the *kun* principle, the concepts of general relativity, quantum gravity, and ghost-free gravity can be seen as attempts to understand the nature of the force of gravity and its relationship to the massive bodies that generate it. As the Earth’s gravitational fields receive and wrap all massive bodies, these theories seek to understand how gravity interacts with and shapes the fabric of spacetime. As the *kun* principle embodies the feminine principle of accommodation and receptivity, these theories seek to uncover the hidden workings of the universe through observation, experimentation, and mathematical modelling.

However, it is important to note that while speculative metaphysics/theoretical physics can be fascinating, it is still necessary to rely on empirical data and scientific rigour to progress in understanding the universe. The detection of gravitational waves is a prime example of how scientific discovery can provide new insights and challenge existing theories.

In contemporary physics, the concept of a Planck scale refers to the scale at which the properties of spacetime become quantum mechanical and where the effects of gravity and other fundamental forces are expected to be of equal strength. At such small scales, it is currently unknown how to reconcile quantum mechanics and general relativity, which is why this is an active area of research in theoretical physics. Within Chinese philosophy, certain concepts like 'spirits', 'ghosts', and 'gods' have been employed to represent energies that are not directly observable but are believed to have a role in shaping the physical world. In essence, these concepts refer to underlying forces that are thought to influence the workings of the universe, including human experience and perception of reality. This belief is based on the idea that everything is interconnected and that the physical world is only a part of a larger cosmic reality governed by these invisible energies. The presence of matter and energy causes the fabric of spacetime to warp, leading to the effect of gravity. This paper concludes that The Supreme Polarity [ *taiji*] is the source of all activities involving fluctuation and transformation, and gravity contributes to the fluctuation. The interplay of *yin* and *yang* can be compared to a wave-like fluctuation, with the forces alternating unpredictably and resulting in different sub-states or 'images' represented by the hexagram. This concept is linked to the idea that all activities arise from the interaction of The Supreme Polarity between heaven and earth.

In the context of this paper's argument, the interplay of *yin* and *yang* can be seen as a metaphor for the wave-like fluctuation of the fabric of spacetime caused by the presence of matter and energy. The forces of *yin* and *yang* alternate unpredictably, just as spacetime fluctuation constantly changes due to the movement of matter and energy. Furthermore, the paper suggests that the materialization of images from heaven through observation and action is related to the concept of the observer effect in quantum mechanics. This effect states that the act of observing a system can affect its behaviour<sup>46</sup>, and the paper suggests that this effect can also apply to the materialization of images from heaven to become a realised artefact on earth (shaped reality). The idea of images materializing from heaven to earth through observation and action emphasizes the role of observation and action in shaping reality. Accordingly, reality is not fixed or predetermined; instead, it constantly changes and evolves. Therefore, the observation of reality, or the way things are, is seen as a necessary step in understanding how to act or intervene in the world to create change. In this sense, the observer's state of mind and action can influence the materialization of images, as they are actively participating in the creation and transformation of the universe. Therefore, the interplay of *yin* and *yang* and the materialization of images can be seen as interconnected aspects of the universe's fundamental activity, constantly fluctuating and transforming. Therefore, the interplay of *yin* and *yang* and the fluctuation of the spacetime fabric can be seen as a metaphor for the constant transformation of reality. Matter and energy, which warp the fabric of spacetime, can be seen as manifestations of the Supreme Polarity or *taiji*, while the fluctuation of the fabric of spacetime results from the interplay of these forces. Therefore, the act of observation and intervention in the world is seen as a way of materializing the images in heaven on earth, and in doing so, participating in the ongoing transformation of reality.



The relationship between the fluctuation of the spacetime fabric, the interplay of yin and yang, and the materialization of images in heaven on earth through observation and action is complex and multifaceted, drawing on multiple philosophical traditions and scientific theories.

While these concepts may not have a direct counterpart in modern physics, they may offer alternative ways of thinking about the underlying nature of reality that could be relevant to the study of gravity. This paper argues that the terms 'spirits', 'ghosts', and 'gods' fundamentally are interconnected and interdependent energies. They are thought to play a role in the formation and evolution of the universe as well as in the workings of the human body. However, it is important to note that using such concepts in Chinese philosophy does not necessarily imply a belief in their existence as literal entities. Instead, they may be seen as metaphorical or symbolic expressions of fundamental principles and energies that are thought to underlie physical reality.

While there may be some similarities between the concepts of 'spirits', 'ghosts', and 'gods' in Chinese philosophy and the properties of energy at the Planck scale, it is important to approach these ideas with caution and to consider them in the context of their cultural and historical origins. Ultimately, the nature of reality at the Planck scale remains a subject of ongoing scientific inquiry, and our understanding of it will likely continue to evolve in the future.

In conclusion, the problems of quantum and ghost-free gravity remain challenging. While detecting gravitational waves is a significant step forward, much work must be done to fully understand the nature of space, time, and gravity. In addition, exploring different philosophical perspectives, such as those found in Chinese philosophy, may provide new insights and avenues for investigation. Still, empirical data and scientific inquiry will ultimately guide us towards a more complete understanding of the universe.

## Statements and Declarations

### Conflict of Interest Statement

The author declares that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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**David Leong, Ph.D.**, is an entrepreneurship theorist with over twenty-five years of practical experience as a serial entrepreneur. His entrepreneurial journey commenced shortly after obtaining his Bachelor of Business Administration

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Dr. Leong has been the driving force behind the inception of no fewer than fifteen ventures, traversing sectors that include corporate finance, consultancy in business and marketing, technology solutions, asset management, and human resources.

Acknowledged as an authoritative figure and thought leader in the business domain, Dr. Leong's expertise is frequently solicited by local media outlets like The Straits Times, Business Times, Lianhe Zaobao, and Channel News Asia, particularly for his insights on economic trends, political analyses, and human resources developments. His academic endeavours are focused on the study of entrepreneurship, while he also has a scholarly interest in the ancient Chinese Yijing (Book of Changes), exploring its intersections with contemporary scientific fields such as quantum physics.

Dr. Leong is a prolific contributor to academic and professional literature, authoring numerous articles and book chapters that span his diverse research interests. He has also penned a book titled “Uncertainty, Timing and Luck on Quantum Terms in Entrepreneurship”, which delves into the nuanced interplay of chance and strategic decision-making in the entrepreneurial landscape- <https://www.amazon.com/Uncertainty-Timing-Quantum-Terms-Entrepreneurship/dp/1636483534>

For a more comprehensive overview of his work and contributions, please refer to <https://peopleworldwide.com/davidleong.html>



## Endnotes

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<sup>7</sup> Joseph A. Adler, *The Original Meaning of the Yijing: Commentary on the Scripture of Change* (Columbia University Press, 2020), p 281-282.

<sup>8</sup> Carl Gustav Jung, "Forward" in Wilhelm and Baynes, 'The I Ching or Book of Changes (Vol. 31)' (Princeton University Press., 2011).

<sup>9</sup> C. G. Jung, *Synchronicity: An Acausal Connecting Principle. (From Vol. 8. of the Collected Works of CG Jung) (New in Paper) (Vol. 30).* (Princeton University Press., 2010).

<sup>10</sup> Wilhelm and Baynes.

<sup>11</sup> Wilhelm and Baynes.

<sup>12</sup> Stephen M. Modell, 'Philosophical-Scientific Musings on the Ultimate Nature of Synchronistic Events and Their Meaning', *Ultimate Reality and Meaning*, 38.1–2 (2021), 50–72 <<https://doi.org/10.3138/uram.38.1-2.50>>.

<sup>13</sup> Intuitively perceptual is closely related to Jung's collective unconscious. The collective unconscious denotes a segment of the unconscious psyche that encompasses shared mental concepts and impulses, introduced by the renowned psychiatrist Carl Jung. This aspect of the psyche is believed to be universal among humankind, rooted in the inherited structure of the brain. Jung posits that the collective unconscious consists of primal symbols, known as archetypes, as well as instincts. He contends that these archetypes and instincts profoundly shape the lives of individuals, who encounter and imbue them with meaning through their experiences.

<sup>14</sup> Lucian Gideon Conway, Meredith A. Repke, and Shannon C. Houck, 'Psychological Spacetime', *SAGE Open*, 6.4 (2016), 215824401667451 <<https://doi.org/10.1177/2158244016674511>>.

<sup>15</sup> Conway, Repke, and Houck.

<sup>16</sup> Quantum foam or spacetime foam is a theoretical concept in physics that suggests that on very small scales, spacetime is not a smooth and continuous fabric, but rather a chaotic and turbulent 'foam' of fluctuating energy. This fluctuation arises due to the inherent uncertainty in the position and momentum of subatomic particles, as predicted by quantum mechanics.

As a result, virtual particles are believed to constantly pop in and out of existence in this foam, briefly existing for a tiny fraction of a second before annihilating each other. This phenomenon is known as particle-antiparticle pair production and is well-established in quantum field theory. The concept of quantum foam was first proposed by John Wheeler in 1955, and it has since become an important area of research in quantum gravity and the search for a theory of everything. Although direct experimental evidence for quantum foam is elusive, it has important implications for the behaviour of spacetime at the smallest scales and the nature of the universe as a whole.

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- <sup>29</sup> Wheeler J A and Ford K W 2000 *Geons, Black Holes, and Quantum Foam: A Life in Physics* (New York: W W Norton & Company) p. 153.
- <sup>30</sup> Adler (2020, p. 270).
- <sup>31</sup> 3D wave illustration credits to Rohlf, W., Rietz, M., & Scheid, B. (2018). WaveMaker: The three-dimensional wave simulation tool for falling liquid films. *SoftwareX*, 7, 211–216. <https://doi.org/10.1016/j.softx.2018.07.003>
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- <sup>33</sup> Bernardo and others (2020, p. 33).

<sup>34</sup> S L.Dubovsky, 'Phases of Massive Gravity', *Journal of High Energy Physics*, 2004.10 (2004), 076–076

<<https://doi.org/10.1088/1126-6708/2004/10/076>>.

<sup>35</sup> The concept of massive gravity in theoretical physics involves adjusting general relativity to give the graviton a non-zero mass. This alteration results in gravitational waves following a massive wave equation and traveling at speeds that are lower than that of light in the classical theory.

<sup>36</sup> Bimetric gravity, also known as bigravity, encompasses two distinct categories of theories in the field of physics. The first category involves modified mathematical models of gravity that employ two metric tensors instead of one. On the other hand, the second category involves the introduction of a second metric tensor at high energy levels. This introduces the possibility of an energy-dependent speed of light, thus allowing for models that account for a variable speed of light.

<sup>37</sup> Horndeski's theory, introduced by Gregory Horndeski in 1974, is a comprehensive theory of gravity in four dimensions. It is unique in that its Lagrangian is built upon both the metric tensor and a scalar field and produces second-order equations of motion. This characteristic distinguishes it from other theories of gravity that lead to higher-order equations of motion. The versatility of Horndeski's theory has made it applicable in various areas, including the development of cosmological models to explain the phenomena of inflation and dark energy.

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