



RESEARCH ARTICLE

Understanding cosmopsychism based on stochastic electrodynamics from the perspective of the Indian knowledge system

Rajeshwar Mukherjee^{1*}, Uday S. Dixit²

Abstract

Cosmopsychism is a novel paradigm that has the potential to respond to the hard problem of consciousness. It is based on the theoretical framework of stochastic electrodynamics. Considering both consciousness and matter as the primary reality, cosmopsychism describes the dynamic interaction of the brain with the ubiquitous field of consciousness (UFC), resulting in a number of information states. The UFC is conceived to exhibit twofold properties— extrinsic and intrinsic. The extrinsic property has the characteristics of the field of physics, whereas the intrinsic property is hard to decipher but is interpreted in terms of the characteristics of a color palate representing different shades of consciousness. Scientific analysis reveals that the concept of UFC, as theorized in cosmopsychism, resonates with the philosophical ideas of the Indian knowledge system (IKS). This article attempts to integrate the paradigm of cosmopsychism with the philosophical insights of the IKS in order to develop a holistic framework that contributes substantially to the science of consciousness.

Keywords: Ubiquitous field of consciousness, Zero-point field, Normal modes, Qualia, Indian knowledge system.

Introduction

Cosmopsychism is a new paradigm in the science of consciousness that is a possible response to the hard problem of consciousness (Chalmers, 1995). It is based on the laws of theoretical physics but can be correlated, at least qualitatively, with the insights of ancient Indian wisdom (Keppler, 2012; Shani & Keppler, 2018). The central idea of cosmopsychism is that an all-pervasive field of consciousness permeates the physical universe, termed the ubiquitous field of consciousness (UFC), where the concept of field here

has reference to the core foundation of physics (Keppler & Shani, 2020). This field is postulated to have a dual aspect concerning the cosmos—the extrinsic and the intrinsic. The extrinsic aspect is related to the physical manifestation of nature, whereas the intrinsic aspect is phenomenological. In accordance with the characteristics of fields in physics, the UFC expresses itself as a spectrum of oscillations termed normal modes and satisfies symmetry properties like homogeneity, isotropy, scale invariance and Lorenz invariance in its initial state. Each normal mode is associated with some specific energy and frequency. Given these properties, the UFC may be considered a ubiquitous and formless ocean of activity with entirely uncorrelated modes (Keppler, 2016). From the intrinsic perspective, the oscillatory spectrum represents a phenomenal ‘color palette’ in which every normal mode is associated with a ‘phenomenal hue.’ Accordingly, the ground state of the UFC may be viewed as an undifferentiated ocean of consciousness in which all the phenomenal elements of awareness are inherent (Keppler, 2012; Keppler & Shani, 2020). To sum up, the spectrum of normal modes exhibits extrinsic physical manifestations along with an intrinsic phenomenal essence. Thus, the UFC, on one hand, has the properties of physics and, on the other hand, incorporates the characteristic features of consciousness (awareness or sentience). When looking for a suitable candidate for a ubiquitous background field that permeates the whole universe, it seems natural to

¹School of Hindu Studies, Nalanda University, Rajgir, Nalanda, Bihar, India.

²Center for Indian Knowledge Systems, Indian Institute of Technology Guwahati, Guwahati, Assam, India.

***Corresponding Author:** Rajeshwar Mukherjee, School of Hindu Studies, Nalanda University, Rajgir, Nalanda, Bihar, India, E-Mail: mukherjee.rajeshwar@nalandauniv.edu.in

How to cite this article: Mukherjee, R., Dixit, U.S. (2023). Understanding cosmopsychism based on stochastic electrodynamics from the perspective of the Indian knowledge system. *The Scientific Temper*, 14(3): 641-648.

Doi: 10.58414/SCIENTIFICTEMPER.2023.14.3.12

Source of support: Nil

Conflict of interest: None.

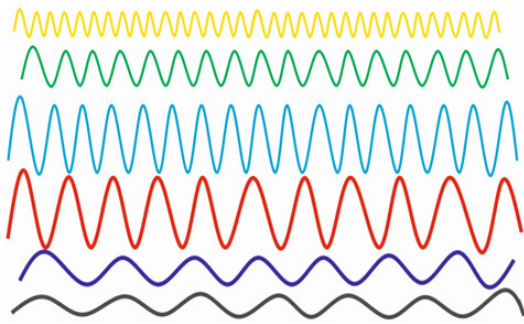


Figure 1: Pictorial representation of the ubiquitous field of consciousness

identify the UFC with the zero-point field (ZPF) of quantum electrodynamics (Keppler & Shani, 2020).

Consequently, a particular frequency component (mode) of the field corresponds to a particular phenomenal quality. Thus, the full spectrum of ZPF modes spans the full spectrum of phenomenal qualities. These phenomenal qualities are referred to as the *qualia*. Correlations between the individual ZPF modes are absent in the disordered ground state. In other words, the ZPF is taken to be the primordial, undifferentiated ocean of consciousness. Pictorial representation of the ubiquitous field of consciousness (Figure 1).

In a nutshell, the full spectrum of normal modes of the UFC has an extrinsic manifestation in terms of frequencies and an intrinsic essence represented by a phenomenal color palette. The features of such a UFC and its dynamics can be explained within the framework of stochastic electrodynamics. Before proceeding further, a brief introduction to stochastic electrodynamics is provided in the following subsection.

The conceptual framework of cosmopsychism was formally pioneered by Joachim Keppler (Keppler, J. 2012). His works aimed at building up a scientific theory of consciousness theory interfacing philosophy with theoretical physics. He has stated that the root of the theory can be traced to Indian Philosophy. He, in his work, has made reference the Buddhist Philosophy. Later, he and his co-workers (Keppler & Shani, 2020) contributed to finetuning of the theory through a series of publications. It is worth mentioning that variants views of the theory of cosmopsychism were put forth in succession by Mathews (2011); Jaskolla and Buck (2012); Keppler (2013); Shani (2015); Nagasawa and Wager (2017); and Goff (2017). Some papers linking Indian and world philosophy with the theory were also published by a host of scholars (Ganeri 2020, 2022; Gasparri 2019, 2022; 2022; and Velmans 2021). The present work is a humble attempt to interface the primary sources of the indian knowledge system (*Rigveda*, Upaniṣads, Yogasūtra, and Śrīmadbhagavadgītā) with the theory of Cosmopsychism without entertaining any philosophical wrangling. As Sāṃkhya and Yoga are fundamentally inherent in vedic wisdom, extensive allusion is made to the

primary principles and texts of these knowledge systems. The seminal interpretations of Indian knowledge systems by Swami Vivekananda, done in a scientific temper, have been adhered to in this work. The primary objective of this paper is to make a scientific characterization of the profound concepts of ancient Indian wisdom without subscribing to any lopsided views of the schools of thought. The goal is to lay down the foundation of a scientific model of consciousness based on ancient Indian wisdom within the framework of theoretical physics. The work aspires to be a precursor to the development of such a universal model, which will be scientifically mistake-proof and philosophically insightful. The richness of ancient Indian wisdom lies in the fact that it has a universal approach to all noble thoughts and ideas. Therefore, the interface between science and Indian wisdom will definitely unravel new frontiers of knowledge.

Overview of Stochastic Electrodynamics

Stochastic electrodynamics is a theory that is based on the concept of the motion of charged particles, which interact with electromagnetic fields. It assumes the existence of random electromagnetic radiation that fills up the space. Such background radiation is considered to be a stochastic field that is classical in nature. The concept of background radiation is fully compatible with the classical theory of electrodynamics.

The foundation of stochastic electrodynamics (SED) has its origin in the goal of establishing the laws of quantum mechanics from first principles (Marshall, 1963, 1965; Boyer, 1969, 1975). Based on more recent developments, the formalisms of quantum mechanics and quantum electrodynamics has been derived conclusively (De la Pena and Cetto, 1994, 1995, 2001). Have the primary consideration of SED is that an ocean of energy pervades the universe. This ocean of energy is equated with a vacuum imbued with a stochastic radiation field, namely, the ZPF described above. The undisturbed ZPF can be portrayed as a sum of plane electromagnetic waves with random phases and characteristic power spectrums constituting the background activity present even at absolute zero (Keppler, 2013).

In consonance with the concept of conventional quantum field theory (QFT), the vacuum of SED is conceived of as an entity that is filled with permanent activity. However, in contrast to QFT, which considers this activity as virtual fluctuations, SED attributes a real existence to the background field (Shani & Keppler, 2018). The concept of ZPF forms the basis of the formalism of stochastic electrodynamics. It is the classical analog of the quantum vacuum, representing a quantum field's minimum energy state. On the contrary, SED introduces a stochastic classical background electromagnetic field. The random electromagnetic fluctuations, conceived in the theory, offer perturbations which can mimic several quantum phenomena, retaining their classical nature. Therefore, QFT

considers creation as the 'selective population of the void,' while SED explains creation as the selective restriction of the ZPF (Keppler, 2012).

The SED paradigm entails that every physical system has a permanent connection with the ZPF and exhibits the behavior of a stochastic oscillator. The ZPF functions as the driving force as long as it dominates over thermal noise. In such a scenario, the energy exchange between a system and the ZPF can reach a stable equilibrium where the average power radiated by the system balances the average absorbed power (Keppler, 2013, 2018). These balance situations correspond to the stationary states predicted by quantum theory (De la Pena and Cetto, 2001, 2006). Thus, the balance between a dynamical system and the ZPF exhibits quantum nature, and it is found that upon reaching the equilibrium, the ZPF-driven system falls into a stable attractor (De la Pena & Cetto, 1995). It is also noteworthy that both the physical system and the ZPF impact each other's dynamics. In particular, in nonlinear systems, the interaction between the system components and the ZPF leads to the modification of the ZPF in such a way that the field modes involved in the maintenance of the equilibrium undergo phase locking (De la Pena & Cetto, 2001; Keppler, 2013, 2018).

The Fundamental Tenets of a SED-inspired Cosmopsychism

The salient features of cosmopsychism can be put forth as follows (Keppler & Shani, 2020):

- Every physical system in this universe is considered an open stochastic system permanently connected with the random ZPF.
- The components of every physical system, in interaction with the ZPF, behave as stochastic oscillators.
- With sufficiently large coupling strength between the oscillating system components and the resonant field modes, along with shielding of thermal noise, the system-ZPF interaction can reach an energetic equilibrium.
- An equilibrated system falls into an attractor, representing a dynamically stable state and exhibiting quantum behavior.
- As a result of the orchestration of an attractor, the initially chaotic ZPF is influenced so that it attains a partially ordered state characterized by an attractor-specific set of phase-locked field modes. Due to the assumed intrinsic phenomenological nature of the ZPF, such a set of modulated field modes is associated with a set of phenomenal hues, which corresponds to a differentiated phenomenal state.
- On the part of the system, the dynamic coupling to the ZPF manifests itself in the form of 'collective cooperation' and 'long-range- coherence.'

Brain Dynamics and Consciousness

The matter-ZPF coupling mechanism outlined in section 1.2 gives a clear indication of identifying features of brain dynamics related to conscious states; it sheds new light on the relationship between the dynamics of the brain and phenomenal states. In concrete terms, the brain is expected to display the typical characteristics of a macroscopic quantum system whose activity patterns are governed by a universal mechanism. These expectations are fully compatible with empirical evidence on the neural correlates of consciousness, suggesting that conscious states are associated with phase transitions that result in the formation of coherent activity patterns (Keppler, 2013, 2018, and references therein). From these findings, the conclusion can be drawn that the brain is a resonant stochastic oscillator that couples to a specific range of ZPF modes. These ZPF modes may be viewed as a keyboard used to generate a wide variety of conscious states. Significantly, the analysis of large amounts of data reveals that brain activity cannot be explained in terms of deterministic models but requires stochastic oscillator models (Burns *et al.*, 2010; Burns *et al.*, 2011). Modifying a set of ZPF modes gives rise to a differentiated state of consciousness that emerges from the undifferentiated form of consciousness. In the case of conscious perception, an external stimulus entering the brain induces a cortical phase transition that affects a modulation of the ZPF (Keppler, 2018). The ZPF modulation engenders a concrete, differentiated, and conscious state, which may be considered as one conscious state of mind. In the self-referential operating mode, associated with thought processes and memory retrieval, a modulated ZPF state (a differentiated conscious state such as a concrete thought) induces a resonant brain-ZPF coupling, further initiating subsequent brain processes (Keppler, 2018). Here in this paradigm, the mind can be visualized as a collection of all modulated ZPF states generated by the brain that exist in the ZPF.

In a nutshell, the ZPF is postulated as the primordial consciousness's substratum. The neural activity in the brain, more precisely the formation of stable attractors, causes the modification of the ZPF, resulting in the generation of partially ordered ZPF states, termed information states, which can be considered as the stream of consciousness. Each particular information state corresponds to a particular conscious state. This concept is schematically depicted in Figure 2 (Keppler, 2012).

Insights from ancient Indian wisdom

Indian knowledge tradition conceives matter and consciousness as the fundamental aspects of reality (Vivekananda, 2013 a). It permeates every object of the universe and also pervades every living being, giving rise to the awareness of names and forms (Swahananda, 2009). Consciousness is concurrently existent with the matter in this

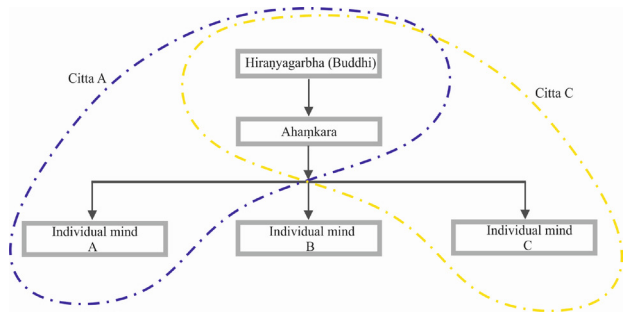


Figure 2: Schematic diagram of citta

universe. Although the human mind appears to be the seat of all awareness and cognition, it is considered to be a material object (product of *Prakṛti*) that manifests consciousness to a relatively higher degree. The interplay of matter and consciousness, at the level of mind, engenders different forms of conscious patterns leading to the knowledge of the physical universe. Table 1 shows classification of different states of consciousness

The mind in Indian wisdom is popularly known as *manas*. It connects the physical universe with its phenomenal essence giving rise to the perception of worldly objects. It is considered a subtle matter that forms an interface between the physical world and consciousness. As a matter of fact, consciousness percolates through the mind (to interact with the physical aspects of the body) (Vivekananda, 2013 b). The functional unit of perception is termed *citta* (mind-stuff), which performs the coordination of *manas*, *ahaṃkāra*, and *Buddhi* (Figure 2). *Manas* captures information from the physical universe and records it for further processing, *Ahaṃkāra* generates the sense of individuation, and *Buddhi* is the faculty for subtle decision-making. These three units perform in tandem to accomplish the act of perception.

The stimuli from the physical universe are said to enter the external sense organs in the form of vibrations (waves or impulses). The information is carried to the brain centers through nerve currents, which consequently get activated. The *citta* (mind-stuff) from the other end reaches out to the information coordinated by the brain centers and processes it further, making for conscious perception. The reaction of the *citta*, in the form of a wave, to such external stimuli is the thought wave (*citta-vṛtti*) (Vivekananda, 2013c) (Figure 3). This dynamic interaction develops a sense of perception of

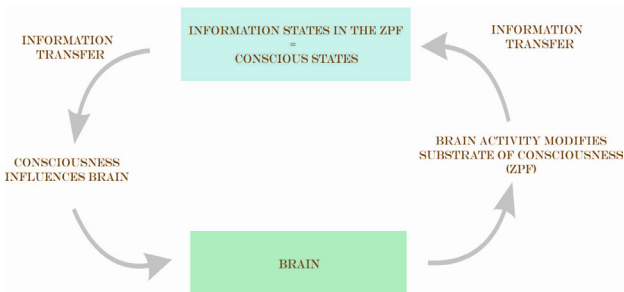


Figure 3: Brain- ZPF Interaction

the external object. Whenever the mind-stuff ceases to react to all sorts of external disturbances, the state of the void is said to be attained. As a matter of fact, the mind-stuff (*citta*) is enlightened by consciousness as it is inherently associated with the *Hiraṇyagarbha* or *Buddhi*. *Hiraṇyagarbha* is the primordial entity (Trivedi, 2007) that has both a material aspect and a conscious aspect (Gambhirananda, 2000). The *Hiraṇyagarbha* evolved as this universe of space, time, and causality, and as such, matter and consciousness are implicit within the universe from the beginning of time. It is apt to put on record that consciousness is not a derivative of matter or an emergent property, which is contrary to some of the prevalent views of modern science.

The *Hiraṇyagarbha* is also called *Buddhi* owing to its association with pure consciousness. It bears the imprint of the primordial form of vibration, *sphoṭa*, as its fabric. (Vivekananda, 2013 d). This *sphoṭa* is not simply a material vibration but throbs with consciousness.

Looking at the *citta*, the individual instrument of perception, different conscious states with temporal variation can be observed. These states, which are classified into different groups, are recorded as follows (Hariharananda, 2015) (Table 1):

- *Kṣipta* (Multifaceted and disordered)
- *Mūḍha* (Dull)
- *Vikṣipta* (Ordered and disordered)
- *Ekāgra* (One-pointed and focussed)
- *Niruddha* (Void)

Each of these states is extremely significant from the cognitive science perspective and can be demystified in terms of neuroscience.

Pauli-Jung Theory and Quantum Holism: A Retrospection in the Light of Indian Wisdom

In their attempt to develop a holistic view of reality, Wolfgang Pauli (1900–1958) and Karl Jung (1875–1961) made a pioneering contribution in building up the scientific framework to describe the functioning of the mind-stuff being connected with an underlying background, which has both material and conscious aspects. Their thoughts are based on the ideas of quantum holism. To bridge the rift between the ‘unconscious’ and the ‘conscious,’ the concept of holistic realism has been invoked. A background reality that accounts for both ‘physis’ and ‘psyche’ has been perceived. This is a psycho-physically neutral domain underlying reality’s material and mental aspects. It has been referred to as a holistic domain before transitioning to the measured state. Such a transition is considered a transition from non-Boolean domains to domains with Boolean classifications (Atmanspacer & Fach, 2015a). It is well-known that the framework of quantum physics suggests applying complementary Boolean descriptions for worldly objects. It also prescribes a to apply a non-Boolean description of a

Table 1. Classification of different states of consciousness

<i>Multifaceted and Disordered States (Kṣipta)</i>	<i>Dull state (Mūḍha)</i>	<i>Ordered and Disordered (Vikṣipta)</i>	<i>One pointed (Ekāgra)</i>	<i>Void (Niruddha)</i>
a. Chaotic state.	a. hypoactive	a. Intermittently concentrated	a. Concentrated at a single point	a. Totally free from fluctuations
b. Multi-directional	b. Unfocused	b. Active state	b. Single wave	b. No excitation
c. Easily attached to pleasure and pain	c. Less emotions	c. Occasionally focused and occasionally unfocused.	c. Order	c. No attachment.
d. Unfocused	d. Direction-less	d. Single and multi-directional	d. One directional	d. No emotions
	e. Neither Chaos nor Order	e. Emotions are there but less.	e. Less Emotion	e. No perception.
	f. Difficult to bring activity	f. Concentrated, sometimes diffused.	f. Least attachment	
	g. Lethargic	g. Active	g. Conscious	

world without an a priori given the mind-matter distinction. Physics and psychology point to their common basis in diverse ways, but the basis itself is unitary. It is a neutral, psycho-physical, and unitary domain, which a non-Boolean neutral language can describe. As a matter of fact, reality, which is beyond the distinction of mind and matter, is undifferentiated and unitary. It transcends mind and matter, and yet it is the source of them. Pauli was bold enough to propose that mathematical symbolism can transcend the domain of physics and may be extended to a greater domain (Mukherjee, 2020a). The Pauli-Jung framework is called the 'dual-aspect monism,' which is centered around the following seminal ideas:

- Local realism and quantum holism are interrelated. Local realism involves the principle of locality and the principle of realism. The principle of locality implies that the cause of a physical change must be local. On the other hand, the principle of realism accepts that the properties of objects are real and exist in the universe independent of the mind. Quantum mechanics describes nature as non-separable. It implies that the objects separated spatiotemporally are said to have states that cannot be fully specified without reference to each other. The term quantum holism depicts such an idea.
- Consciousness is related to the unconscious.
- There is a common, neutral background underlying the conscious realm and physical realm. (Atmaspacher and Fach, 2015b)

The unitary background reality is characterized by the features of *Hiraṇyagarbha* of Indian philosophy (Mukherjee, 2020b). On the other hand, the approach of Indian wisdom and cosmopsychism also closely resembles the theory of Pauli and Jung. The theory of Pauli and Jung lacks the flavor of the mathematical demonstration, whereas cosmopsychism is based on scientific concepts with the potential to develop into a proper mathematical framework.

Materials and Method

The study involves the following methods of research:

- Textual study: One of the methods adopted is a close reading of the standard scriptural texts like the *Rigveda*, Upaniṣads, *Yogasūtra*, and *Srīmadbhagavadgītā*, and their classical and modern commentaries. Significant

modern commentaries and interpretations of the texts have also been studied to comprehensively understand the ideas. The vedas are the knowledge par excellence, which also includes the upaniṣads. It is well known that the vedic corpus deliberates on the supreme reality and its manifestation as the cosmic rhythm.

- The *Srīmadbhagavadgītā* is *brahmavidyā*, the science of consciousness as well as yogaśāstra, the practical methods to master the science. The *Yogasūtra* is an authoritative text on the science of yoga and consciousness.
- The study also involves an intensive study of the scientific literature on cosmopsychism and stochastic electrodynamics.
- A comparative study is employed to characterize the concepts of Indian knowledge tradition and to find the parallels in the contemporary scientific world.
- Techniques of Interpretation are used to interface cosmopsychism with the Indian knowledge system.

Table 2: Equivalent between cosmopsychism and Indian wisdom

Equivalence	
SED-Inspired Cosmopsychism	Ancient Indian wisdom
Consciousness	Cit
ZPF	An aspect of Hiraṇyagarbha (Buddhi)
Information states	Cittavṛtti
Brain	Mastiṣka
Physical object	Viśaya

Table 3: Comparison between cosmopsychism and Indian wisdom

<i>SED-inspired cosmopsychism</i>	<i>Ancient Indian wisdom</i>
Consciousness is an inherent property of a ubiquitous background field (ZPF) that permeates the whole universe.	Consciousness envelopes every object of this universe of changefulness (Ghosh, 2020)
Matter and consciousness concurrently exist from the beginning.	The universe is a combination of matter and consciousness. (Swarupananda, 2016; Vivekananda, 2015)
A ubiquitous radiation field called ZPF is characterized by infinite potential and infinite energy underlying the universe, and it is associated with consciousness.	There is a universal principle called <i>Hiraṇyagarbha (Buddhi)</i> which has both material and conscious aspects, and it is the all-pervasive rhythm of the universe. (Trivedi, R.G. 2007; Gambhirananda, 2000)
ZPF accounts for all forces of nature and conscious activities.	All worldly objects and conscious activities are the modifications of <i>Hiraṇyagarbha</i> .

Observations

The equivalences of these two frameworks are proposed in Table 2. They are expected to open up the floodgates of ideas.

The study of the ancient Indian knowledge system in the context of the novel paradigm of cosmopsychism unravels new vistas of profound ideas. The wonderful parallels observed between them derive fresh insights into the scientific process of investigation. Careful study reveals that the projections belonging to these disparate worlds of knowledge ultimately raise the comprehension of the same truth from two different perspectives. The equivalences observed are astounding and provide ample scope for integrating these two mighty learning systems. The equivalent terminologies can be tabulated as follows:

- The conceptual similarity between the knowledge systems is strikingly significant.
- The theory interfacing cosmo psychism with Indian wisdom can be summed up as follows (Table 3):
- Consciousness is an inherent property of nature. Matter and consciousness are the primary realities.
- Consciousness is self-expressing, and it manifests through matter.
- The interplay of matter and consciousness is the cause of the world's appearance.
- The universe is an evolution of matter and a manifestation of consciousness.
- The zero-point field has the properties of physics, but it is also the carrier of consciousness.
- The UFC expresses itself as the spectrum of oscillation and is associated with a color palette representing different shades of consciousness.
- Individual consciousness is referred to as the resultant information states (conscious stages) which arise out of a dynamic interaction process between the physical world and the ZPF. The interaction takes place through the interface of the brain and neural network.
- The UFC can be explained in terms of some aspects of *Hiranyagarbha* or *Buddhi*.

The mapping of the ZPF with an aspect of *Hiranyagarbha* (*Buddhi*) proves to be an important landmark in this field because it marries the conceptual understanding of a scientist with the profound insight of an intuitive seer. The concept of *Hiranyagarbha* is replete with subtle insights so as to provide a host of ideas enabling one to transcend the fragmentary barriers and provide a holistic vision of truth. On the other hand, the concept of the ZPF having its origin rooted in the concrete theory of stochastic electrodynamics gives a rational framework to delve deep into the realm of consciousness from the perspective of physics. Additionally, the different states of consciousness, as depicted in the Indian knowledge system, find scientific justification when interpreted in cosmopsychism.

The classification of the conscious states, viz. multifaceted, dull, ordered-disordered, one-pointed, and void, can be interpreted in terms of the characteristics of the information states arising in the ZPF due to the brain-ZPF coupling. The classes are distinguished, on the one hand, by their phenomenal richness, with the information content of the information states being the appropriate measure of phenomenal richness. The information content, i.e., the complexity of a particular state, depends on the number of ZPF field modes involved in the formation of the state. This is to be seen in the light of the insight that the brain-ZPF interaction results in the modulation (amplification and phase-locked coupling) of the selected field modes. On the other hand, the sequence of information states also plays a role in the classification (Figure 3).

The *kṣipta*, a multifaceted state, corresponds to the state in which many field modes are selected and modulated. This is characterized as 'unfocussed and restless.' This refers to the stream of consciousness, i.e., the sequence of information states. It represents a set of selected and modulated field modes that are permanently changing. *Mūḍha* is a lethargic state of mind characterized by fatigue, lack of motivation, and depressiveness. This is a dull state which represents a state in which a band of fields with low intensities is selected and modulated. *Vikṣipta* is characterized as partially focused and partially unfocused. It is an intermediate state between a one-pointed state and a multifaceted state. *Vikṣipta* represents a set of selected and modulated field modes that are permanently shifting between the two states. One-pointedness represents a state in which a particular field mode or a small band of field modes is selected and modulated. The state of the void is the experience of limitless bliss and oneness in which no particular field modes are selected and modulated. The "phenomenal void" corresponds to a state in which no particular field modes are selected and modulated. In this state, a person may experience the "unmodulated" ground state of the field, which is reported to be a state of love, bliss, and unlimited oneness.

Discussion

Having its origin rooted in the intellectual and spiritual traditions of ancient India, the science of meditation has witnessed huge growth in the last few decades (Tracy Brandmeyer, 2019). The area has not only been the domain of interest of spiritual aspirants but has also intrigued the scientific community to a great extent. Its intersection with neuroscience and consequent experimental validation of its effects in the clinical and allied fields has earned a prominent place for it in the mainstream science of consciousness. In recent times, several systems of meditation belonging to different schools have gained a commanding influence on the earth. There is no dispute that most of the systems of meditation had their humble beginning in the

Indian spiritual tradition. However, their admixture with diverse cultures and traditions has given rise to numerous novel schools of yoga and meditation. Transcendental meditation (Aron, 1981) and cyclic meditation (Lakshmi, 2023) are examples of such modern incarnations of several traditional methods enshrined in Indian scriptures. These newly evolved systems are subjected to scientific methods of investigation having bearings on the recent trends in the neuroscience of consciousness. It is a universally accepted fact that Indian tradition has a long legacy of inquiring into the nature of consciousness (Keppler, 2012). The ultimate goal is to bring about overall human well-being through the performance of yoga and meditation. The practical methods are backed up by theoretical frameworks, which need scientific validation. The neural correlates, corresponding to different cognitive states and meditative states, as referred to in Indian knowledge-tradition systems, need to be properly identified. The neural correlates of consciousness are the minimal neural mechanisms that are necessary and sufficient to experience any conscious percept. (Crick and Koch, 1990). The integration of these neural correlates with the framework of consciousness will help build up a comprehensive theory which has the potential to support different forms of meditation.

Conclusion

It requires mention that this SED-based approach of cosmopsychism has not only a bearing on the current developments of neuroscience but also contributes to the expansion of the frontiers of the science of consciousness. It is a doorway to the knowledge of the relationship between the brain and the fundamental aspects of consciousness. The study reveals that the relationship between the brain and consciousness can be more intensively understood by deriving profound insights from ancient Indian wisdom, which has a long tradition of consistently cultivating the knowledge of consciousness (Keppler, 2013). The congruence of ideas between Indian thoughts and the SED-based approach sheds new light on the nature of consciousness. The integrated approach accepts the ZPF as a fundamental property of nature which is the substratum of consciousness. Therefore, ZPF can be considered as a promising candidate for the carrier of consciousness. As such, human consciousness is the result of the dynamic interaction process that causes the realization of the ZPF information states. The present theory upholds that consciousness is not an emergent property of matter, but matter and consciousness have the ZPF as their common basis. The ZPF orchestrates matter giving rise to a wide variety of phenomena in the physical universe. (Keppler, 2013). Being all-pervasive and having unique properties, the concept of the ZPF emerges as the universal background of all conscious minds. It raises the comprehension that the brain, as a complex system, is able to filter multiple forms

of sensations and emotions out of the ubiquitous field of consciousness leading to the formation of a sequence of attractors. Every attractor generates a frequency pattern playing the role of a frequency filter on the ZPF. It is implied that every ZPF information state corresponds to a conscious state. Accordingly, the brain creates an individual stream of consciousness by regularly modifying the ZPF and creating ZPF information states (Keppler, 2013).

The theory facilitates the scope of interfacing Indian wisdom with the modern scientific approach of stochastic electrodynamics, which is a novel approach to the science of consciousness. It is true that the theories of Indian intellectual tradition lack mathematical details and structured presentations; nevertheless, the profundity of the projections of the ancient Indian seers in regard to consciousness injects new thoughts and novel ideas into this new system of knowledge. It is conceived that every normal mode of the ZPF is associated with a phenomenal hue, and therefore, the different shades of consciousness are associated with the ZPF by a color palate. Consciousness being too abstract to demystify, the only recourse available is to derive insights from the Indian wisdom to unmask the nature of consciousness with reference to the suggestions of colors. The way forward is to discover the different facets of *Hiranyagarbha* and the suggestions embedded within it to fit the ideas harmoniously with the characteristic features of the ZPF. The study of the texts and interpretations of the Vedas, including the upanishads, philosophical treatises of Indian tradition, and esoteric tantric texts, have the potential to import new ideas, which can unravel marvelous features of consciousness relevant to the current area of study.

Acknowledgments

The first author gratefully acknowledges the contribution of Prof. Joachim Keppler as a discussion partner who has enriched the paper with his erudite suggestions. He also expresses his gratitude to the Center for Indian Knowledge System, Indian Institute of Technology Guwahati, for hosting him for conducting this research.

References

- Aron, A. (1981). 'The Transcendental Meditation Program in the College Curriculum: A 4-Year Longitudinal Study of Effects on Cognitive and Affective Functioning'. *College Student Journal*, 15(2), 140-46.
- Atmanspacer, H. & Fach, W. (2015 b). *Mind-Matter Correlations in Dual-aspect Monism*. In E.F. Kelly, A. Crabtree, and P. Marshall (Eds.), *Beyond Physicalism: Toward Reconciliation of Science and Spirituality* (p. 198). Rowman and Littlefield.
- Atmanspacer, H. and Fach, W. (2015 a). *Mind-Matter Correlations in Dual-aspect Monism*. In E.F. Kelly, A. Crabtree, and P. Marshall (Eds.), *Beyond Physicalism: Toward Reconciliation of Science and Spirituality* (pp. 195-226). Rowman and Littlefield.
- Brandmeyer, T., Delorme, A., and; Wahbeh, H. (2019). *The Neuroscience of Meditation: Classification, phenomenology, correlates, and mechanisms*. *Progress in Brain Research*, 1–29. <https://doi.org/10.1016/bs.pbr.2018.10.020>

- Burns, S. P., Xing, D., & Shapley, R. (2011). *Is Gamma-Band Activity in the Local Field Potential of V1 Cortex a 'Clock' or Filtered Noise?* 31(26). <https://doi.org/10.1523/JNEUROSCI.0660-11.2011>
- Burns, S. P., Xing, D., Shelley, M., & Shapley, R. (2010). *Searching for autocorrelation in the cortical network with a time-frequency analysis of the local field potential.* 30(11). <https://doi.org/10.1523/JNEUROSCI.5319-09.2010>
- Chalmers, D.J. (1995). *Facing Up to the Problem of Consciousness* (Vol. 2). Routledge. <https://doi.org/10.4324/9780203826430-11>
- Crick F., Koch C. (1990). *Towards a neurobiological theory of consciousness.* *Semin. Neurosci.* 2 263–275.
- de la Peña, L., and Cetto, A. M.. (2001). *Quantum Theory and Linear Stochastic Electrodynamics.* 31(12). <https://doi.org/10.1023/A:1012670800317>
- de la Peña, L., Cetto, A. M., and Cetto, A. M.. (2006). *The Foundations of Linear Stochastic Electrodynamics.* 36(3). <https://doi.org/10.1007/S10701-005-9020-1>
- Gambhirananda, S. (2000). *Eight Upaniṣads: with Commentary of Śaṅkarācārya.* Vol. 2. Kolkata: Advaita Ashrama, (Fifth Impression). P. 411 (*Praśna Upaniṣad* 1.4. and Śaṅkarācārya's commentary).
- Ganeri, J. (2021). *Virtual subjects, fugitive selves: Fernando Pessoa and his philosophy.* Oxford University Press, USA.
- Gasparri, L. (2019). 'Priority cosmopsychism and the Advaita Vedānta.' *Philosophy East and West*, 69(1), 130-142.
- Gasparri, L. (2022). 'Śaṅkaran Monism and the Limits of Thought.' *The Monist*, 105(1), 76-91.
- Ghosh, K. (2020). *The Reflection of Yoga in the Principal Upaniṣads* (p.25) (1st edition). Kaivalyadhama.
- Goff, P. (2017). *Consciousness and fundamental reality.* Oxford University Press.
- Jaskolla, L., & Buck, A. J. (2012). *Does panexperiential holism solve the combination problem?* *Journal of Consciousness Studies*, 19(9-10), 190-199.
- Keppler, J. (2012). *A conceptual framework for consciousness based on a deep understanding of matter.* *Philosophy Study*, 2(10), 689.
- Keppler, J. (2013). *A new perspective on the functioning of the brain and the mechanisms behind conscious processes.* 4. <https://doi.org/10.3389/FPSYG.2013.00242>
- Keppler, J. (2016). *On the Universal Mechanism Underlying Conscious Systems and the Foundations for a Theory of Consciousness.* 6(4). <https://doi.org/10.4236/OJPP.2016.64034>
- Keppler, J., and Shani, I. (2020). *Cosmopsychism and Consciousness Research: A Fresh View on the Causal Mechanisms Underlying Phenomenal States.* 11. <https://doi.org/10.3389/FPSYG.2020.00371>
- Lakshmi, K. S., Jebin, M. F., Venugopal, V., & Maheshkumar, K. (2023). *Successful Pregnancy of a woman with PCOS after intervention with Cyclic Meditation-a Case Report.* *Advances in Integrative Medicine.*
- Marshall, T.W. (1963). *Random electrodynamics.* Proc. R. Soc. London A 276(1367), 475–491. <https://doi.org/10.1098/rspa.1963.0220>
- Mathews, F., & Blamauer, M. (2011). *The Mental as Fundamental: New Perspectives on Panpsychism.*
- Mukherjee, R. (2020 a). *Unraveling the Reality: Interface between Physics and Vedānta* (p. 43-45) (1st Edition). Kaivalyadhama.
- Mukherjee, R. (2020 b). *World: The Expression of the Absolute* (pp. 69-70) (1st Edition). Kavikulaguru Kalidas Sanskrit University.
- Nagasawa, Y., & Wager, K. (2017). 'Panpsychism and priority cosmopsychism'. *Panpsychism: Contemporary Perspectives*, 113-129.
- Sadānanda, Y. (2006). *Vedāntasāra.* Trans. Swami Nikhilananda. (pp. 54-57). Advaita Ashrama.
- Shani, I. (2015). 'Cosmopsychism: A holistic approach to the metaphysics of experience.' *Philosophical Papers*, 44(3), 389-437.
- Shani, I., & Keppler, J. (2018). *Beyond Combination: How Cosmic Consciousness Grounds Ordinary Experience.* 4(3). <https://doi.org/10.1017/APA.2018.30>
- Swahananda, S. (2009). *Chandogya Upaniṣad* (p. 421). Sri Ramakrishna Math.
- Swarupananda, S. (2016). *Srimad Bhagavad Gita* (p. 281). Advaita Ashrama.
- Trivedi, R.G. (2007). *Ṛg-Veda-Samhitā: Together with Padapāṭha & Sāyaṇabhāṣya.* Eight Aṣṭaka. (Hindi Trans.). (p. 488). Chowkhamba Vidyabhawan. (*Hiraṇyagarbha Sūkta, Ṛgveda* 10.121.1).
- Velmans, M. (2021) *Is the Universe Conscious? Reflexive Monism and the Ground of Being.* In Kelly, E. F., & Marshall, P. (Eds.). (2021). *Consciousness unbound: Liberating mind from the tyranny of materialism.* Rowman & Littlefield Publishers.
- Vivekananda, S. (2013 a). *The Complete Works of Swami Vivekananda* (Vol. I, p. 264) (2nd subsidized ed.), Advaita Ashrama.
- Vivekananda, S. (2013 b). *The Complete Works of Swami Vivekananda* (Vol 6, p. 52) (2nd subsidized ed.), Advaita Ashrama.
- Vivekananda, S. (2013 c). *The Complete Works of Swami Vivekananda* (Vol 1, p. 205) (2nd subsidized ed.). Advaita Ashrama.
- Vivekananda, S. (2013 d). *The Complete Works of Swami Vivekananda* (Vol 3, p. 72) (2nd subsidized ed.). Advaita Ashrama.
- Vivekananda, S. (2016). *Raja Yoga* (p. 186). Advaita Ashrama.