

## Realism in Modern Physics and Postmodern Philosophy

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### Abstract

The present paper is an interdisciplinary study which brings together the scientific findings of modern physics with the postmodern philosophical concerns. This paper casts an interpretive light on the key issues of modern physics through the lenses provided by Gilles Deleuze and Felix Guattari. Realism and the real are the focus of the paper. It is argued there are many affinities between the new concept of the real provided by the quantum mechanics and the real as defined by postmodern philosophers. The paper takes up a comparative and interpretative approach and analyzes the issue of the real in a parallel way between modern physics and philosophy. The main objective of the paper is to show how intimately the scientific and philosophical lenses are intertwined with each other.

**Key words:** modern physics, postmodern, real, quantum

### 1. Introduction

From the middle of the Renaissance under the leadership of Francis Bacon, science gradually crept into the life of the West. The Age of Enlightenment with its stress on rationalism paved the way for replacement of religion with science. Scientific reasoning and thinking became a vogue in the nineteenth century to the extent that human psyche got exposed to scientific exploration. Thus the rise of psychoanalysis as a science initiated with Sigmund Freud. Physics has been one of those sciences that have directly influenced human thinking. The movement of modernism and its continuation in postmodernism owes its relativism and multiplicity to Einsteinian Theory of Relativity. This stands a proof for the claim that physics

and philosophy are closely intertwined. They share some common notions, albeit they might differ from one discipline to another.

The present paper focuses on the concept of realism which has become a moot point both in modern physics and postmodern philosophy. Different physicists have provided various notions of realism; some have voted for that, taking the real world as it is working based on some fixed rules, while some others have destabilized the common sense of the real by counter defining the empirical world. This paper scrutinizes the different notions of the real provided by the quantum physicists and tries to investigate whether the physicists' contributions have been conducive to postmodern philosophy expounded by Gilles Deleuze and Felix Guattari. This study looks for similarities as well as points of divergence in the way these philosophers and their counterpart physicists define the real.

The question which lies at the core of this research is how far modern physics and postmodern philosophy can be approached cross-referentially. The paper argues that modern physics has been quite influential in rendering an unstable view of the empirical world which has always been taken for granted not only by scientists but also by philosophers.

## **2. Literature Review**

The rise and development of the quantum mechanics has attracted the attention of many scientists to the concept of realism. Some scientists have been for realism in science and some others against it. In his short article, Paul Marmet (Accessed 2016) deals with absurdities in modern physics and contends physical reality exists only in the case of matter, "since it is the only thing that has its own autonomous existence, independent of any observer's mind, location or time". He thus bases his definition of realism in physics on the autonomous existence of the thing which is independent from an observer. Likewise, Quentin Ruyant (2015) holds belief in physical realism in terms of the autonomous existence of the matter. Ruyant, who tries to bring rapprochements between scientists and philosophers, is of the view that the semantic and metaphysical propositions of scientific realism "are often acceptable by philosophers (at least in the analytic tradition). Only the epistemic aspect is still under discussion".

Vassilios Karakostas (2012) demands radical revision of the concept of physical realism is required by a viable realist interpretation of quantum theory. Karakostas aptly refers to the “scientific revolution” brought about by quantum theory especially on the basis of Bell’s pioneering work. Quoting Michael Nielsen and Issac Chuang (2010), Karakostas pinpoints the elimination of the assumption of realism in quantum mechanics. This issue has already been raised by Arthur Fine (1996), the physicist who has officially announced death of realism: “Its death was hastened by the debates over the interpretation of quantum theory, where Bohr’s nonrealist philosophy was seen to win over Einstein’s passionate realism” (p. 112).

Instead of total eradication of realism, Karakostas in return argues the traditional concept of realism should be revised, “the concept of realism must not be associated with ideas taken over from classical physics, such as atomism, localizability, separability, or similar philosophical preconceptions such as strict subject-object partition, mechanistic determinism and ontological reductionism” (2012, p. 2). This physicist then dedicates the rest of his paper to provide a new version of realism based on the quantum mechanics. Karakostas explicates “well-defined quantum objects, instead of picturing entities populating the mind-independent reality, they depict the *possible manifestations* of these entities within a concrete experimental context” (2012, p. 12); this view of “possible manifestations” not only renders the projection of reality context-bounded but it also opens space for the notion of multiplicity and exposes the real to a process of “becoming” when the contextual circumstances vary. No wonder that Karakostas speaks of objects as “contextual objects”(2012, p. 13).

In the same vein, Cassirer writes, “The tasks of the criticism of knowledge . . . is to work backwards from the unity of the general object concept to the manifold of the *necessary and sufficient conditions that constitute it*. In this sense, that which knowledge calls its ‘object’ breaks down into *a web of relations* that are held together in themselves through the highest rules and principles” (1913, p. 522; emphasis added). What interlinks physics to postmodern philosophy is exactly this sense of contextuality of quantum objects and their subsequent vulnerability to variation under certain conditions. The body of physics study evinces a missing link here between philosophy and physics. Even when physics scholars speak of philosophy,

they suffice only to scientific philosophy which does not necessarily make interdisciplinary references.

Like modern physicists, postmodern philosophers, Deleuze and Guattari, celebrate the postmodern condition for its fluidity and flexibility. Like these quantum physicists, they do away with classical worldview and call for a revised notion which contextualizes every entity and thereby exposes it to variation over changes in the context and conditions.

By contrast, in traditional philosophy, the real has always been taken for granted and regarded as a matter of fact, “the world as it is”. Even with phenomenologists like Wolfgang Iser and Husserl who subjectify the real by their emphasis on the intending consciousness, attempt has been to present the world as it appears to consciousness. The same view justifies the core methodology of Realists in literature and has thus made the writers and poets to show their fidelity to the empirical world by giving an exact replica of it in their works. Thus representational literature was in vogue before the revolutionary changes brought about by science.

### **3. Methodology**

For the study of the concept of realism in modern physics and postmodern philosophy, the present study adopts a comparative-interpretative method. It is comparative as it compares the modern physical notions of the real with the real expounded by philosophers, Deleuze and Guattari. The adopted lens is interpretative since it gives enough space for analyzing and interpreting the concepts of the real in both disciplines.

### **4. Analysis and Discussion**

The point that has encouraged the researchers to draw interlinks between modern physics and postmodern philosophy is the revolutionary concept of the real which Deleuze and Guattari have proposed. These philosophers distinguish between the real and the actual. While traditional realists define the real as that which empirically exists, in time and space, and perceivable through five senses, postmodern philosophers define the real as consisting of two sides: the actual and the virtual. What the scientists deal with and call the real is the actual. But for

postmodern philosophers, the actual is only one part of the real. Deleuze and Guattari do not put the virtual in contrast to the real; rather they state, “the reality of the creative, or the placing-in-continuous variation of variable, is in opposition only to the actual determination of their constant relations” (1987, p. 99). The real encompasses the virtual as well. Deleuze stresses the virtual “must be defined as strictly a part of the real object” (Aldea 2011, p. 20). The virtual is characterized as an “abstract and potential multiplicity” presupposed by time and space. Therefore, the virtual stands in opposition to the actual, not to the real. For these philosophers, the virtual is entirely “self-differing”; it is not specific difference; rather it is free difference, “a state in which determination takes the form of unilateral distinction” (1987, p. 28).

Accordingly, when classical physicists attribute separability to the real objects, their definition of the real objects falls within the chart of the actual. Hence, Einstein acknowledges the physical identity of distant things, the “mutually independent existence of spatiotemporally separated systems (in Karakasos 2012, p. 4). By contrast, the expounders of modern physics vote for non-separability. As notified by Karakostas, the generic phenomenon of non-separability was experimentally confirmed for the first time in the early 1980s (2012, p. 6). The immediate aftermath of this experimentation has been the notion of non-separability of any system however fragmented it might be at the time of observation. This is the point highlighted by Schrodinger who explains the case of two systems which have once entered into a physical interaction but then after a time of mutual influence they separate from one another, “they can no longer be described in the same way as before . . . by endowing each of them with a representative of its own” (1983/1935, p. 161).

Viewed from Deleuze-Guattarian perspective, one can contend the notion of non-separability raised here is a hint at the process of “becoming” which has occurred to both involved systems. Schrodinger’s reference to “a time of mutual influence” implies the two systems influence each other, make each other different from what they were before their entrance into the interaction. And this process of influencing means nothing other than “becoming”. Of the two sides of the real, that is, the actual and the virtual, it is the virtual side which can become the locus of “becoming”; it is the virtual realm that exposes the actual to variation. Based on this, Deleuze and Guattari contend the virtual is featured by the “plane of

immanence” or “a field of intensity” marked by difference-in-itself. (Aldea 2011, p. 19). The difference-in-itself of the virtual is the realm of pure intensity or “differences in intensity” without form or matter”. When this intensity turns into matter and form, the virtual is actualized, and in this process the difference-in-itself becomes “specific difference”.

However, some important thing happens here. In the process of becoming the actual, only one of the many potentials or possibilities of being is given way to become actual. This means that multiple other possibilities of being other have not been given the chance to become actual. But they are retained within the actualized form. In other words, they remain immanent within the actual. This renders the process of becoming ambivalent. On the one hand, becoming makes one possible form to get actual; on the other hand, it reduces the real only in one form of being. The actual owes its dynamism to this ambivalence, because it is both a state of freedom and reduction. Within the actual, multiple other ways of being remain immanent; this multiplicity comprises the virtual side of the real.

The point of non-separability which the quantum theorists refer to is related to this interplay between the actual and the virtual. The real object contains both the actual and the virtual. The two systems of which Schrodinger speaks enter a process of becoming-other while interacting with one another. After some time, when they separate from each other, their otherness remains immanent within them. Thus they can no longer be the ones before the interaction, as that otherness is there in each of them, albeit in their virtual side. As a physicist, Karakostas clarifies that quantum mechanics incorporates as its basic feature that the “whole” is, “in a non-trivial way, more than the sum of its ‘parts’ including their spatiotemporal relations and physical interactions” (2012, p. 6). Adapting this view into Deleuze-Guattarian philosophy, it can be argued the “whole” of which he speaks stands for “the real”, and the “parts” are the actual. In another register, the whole cannot be reduced to its parts. This implies the whole encompasses some other realm, and that is not the spatiotemporal realm or the world reduced to physical interactions. It is the realm of the virtual, the plane of immanence, or difference-in-itself. According to the quantum theorists, the part is made “manifest” through the whole, while the whole could only be “inferred” through the interdependent behavior of its parts (Karakostas

2012, p. 8). The word “manifest” means actuality, while the “inferential” nature of the whole implies its virtuality.

Just as quantum physicists believe in the contextuality or context-dependence of quantum objects, the postmodern philosophers also hold that it is the context or circumstances that provide conditions for one possibility to get actualized and thereby push aside multiple other individuations. What this signifies is that if circumstances change, other ways of being occur, since conditions of their individuation and actualization may be supplied. The quantum scholar is apt when he writes, “well-defined quantum objects cannot be conceived of as ‘things-in-themselves’, as ‘absolute’ bare particulars of reality, enjoying intrinsic individuality. . . . Instead, they represent carriers of patterns or properties which arise in interaction with their experimental context/environment” (Karakostas 2012, p. 10). Based on this, the property a quantum object acquires in a specific context is not its inherent property that it has possessed prior to the object’s entry into the context. Rather, “One and the *same* quantum object does exhibit several possible contextual manifestations in the sense that it can be assigned several definite incommensurable properties only with respect to distinct experimental arrangements which mutually exclude each other” (Karakostas 2012, p. 11). The definition of a quantum object as a totality defined by all the possible relations in which this object may be involved has Deleuze-Guattarian postmodern notion of the real. For them, the real which has the virtual as one side becomes a totality which can never get fixated in one actual or individuated form because in every context, one possibility is actualized. Therefore, the real is the totality of the actual and all other possible actualities.

The other point of divergence between the classical physics and modern physics is the former’s notion of the real as that which exists mind-independently. By contrast, modern physics argues the whole system cannot be conceived mind-independently. Simultaneously, however, the quantum scholars retain sort of scientific objectivity for the objects. Scientific objectivity of quantum objects is realized only because of “conditions of disentanglement” (Cassirer, 1956 p. 179). By “conditions of disentanglement” it is meant conditions of being experienced or being accessible. In another register, due to experimental intervention the factually existing entangled correlations of the object with its environment are suppressed or minimized (Karakostas, 2012, p.



13). Once the objects' correlations are reduced under such conditions they become exposable to scientific experiments and thus can present specific qualities, that is, they become real objects.

The first philosophical implication of this quantum objectivity is the feature of relativity in the sense that with varying conditions of disentanglement and/or accessibility the properties of quantum objects also vary. The relativity results in multiplicity. This point is further supported by accepting the fact that the observer is not situated outside the entangled correlations of the whole system. S/He is also part of the whole system and therefore the so-called objectivity of the objects is only perspectival or context-bounded. This view can be better appreciated in the light of the worldview Heisenberg has given of the world. He defines the world as “a complicated tissue of events, in which connections of different kinds alternate or overlay or combine and thereby determine the texture of the whole” (1958, p. 96). What this view signifies is the fluidity of the world which was used to be regarded as something fixed. Postmodern philosophers celebrate this fluidity and set it as the bedrock on which a wide variety of vision scopes can be adopted and adapted. For them the locus of this is the virtual realm. Deleuze and Guattari define the virtual as “the line of variation” (1987, p. 94).

While for these philosophers, difference is primary to Being, classical realists seek identity in Being. This point can be taken as a node which interlinks the real defined by quantum physics with postmodern concept of reality. The quantum stress on perspectivalism of scientific objectivity connotes nothing other than difference-in-itself. This is obvious in Karakostas' concluding remarks, “Quantum reveals that the hunt of a universal perspective for describing physical reality is in vain. In the quantum domain of inquiry, it would be illusory to search for an overall frame by virtue of which one may utter ‘this’ or ‘that’, ‘really is’ independently of a particular context of reference” (2012, p. 16). This description is an attestation of the fluidity of the quantum objects.

Fluidity owes its dynamism to difference and difference itself arises out of actual-virtual interface. What renders the actual fluid, in postmodern philosophy, is the process of counter-actualization or counter-effectuation. As abovementioned, within the actual there lies a virtual side which is imminent to it. This virtual side renders the actual exposable to variation. Counter-actualization means de-actualizing the actual and re-actualizing a virtual potential or possibility.

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Deleuze-Guattari technical terms for these processes are reterritorialization and deterritorialization. In deterritorialization the territorialities of the actual are negotiated, worked on, modified, altered, and even subverted. In reterritorialization, the new territories are drawn, charted, formulated, and shaped. Their concept of “becoming-other” refers to these two processes. When the quantum object is put under “conditions of disentanglement” to become an objective entity, it is actually exposed by force to this process of deterritorialization and reterritorialization. Without these, the quantum object cannot become an “other” which can be experimented on, observed, and depended. So here comes the point of distinction between classical physics and modern physics.

The classical physics myopically takes the object as “it is there” as that which “can exist independently from the observer’s consciousness”. Therefore, it is described as being “real”. Besides, they take the observer as their criterion for determining the reality of the object. It seems as if the whole universe is reduced only to man’s consciousness. In this respect, one senses a Cartesian tinge of man-centeredness in the universe which is also reiterated, albeit in a somehow contrastive vein, by phenomenologists. This may hint at the restricted scope of their vision. But for modern physics, for the so-called “real object” there is a quantum object, which is the object exposed to specific contextual/perspectival alternations. The quantum object can never be restricted to a property as it is already embedded within a whole system and is involved in correlations with a whole universe which makes them non-separable. While the classical notion of “real object” proves to be illusory, the modern concept is ungraspable and unexplainable. The classical object is limited in scope, confined to the mind of the observer. The quantum object is viewed within a macro-cosmic domain and is thus far from being reduced to an “intending mind”.

## **5. Conclusion**

The present article holds an interdisciplinary study between physics and philosophy. It provides a philosophical interpretation of the way classical and modern physics define the real. Then parallel lines are drawn between the two disciplines, namely modern physics and postmodern philosophy expounded by Deleuze and Guattari. The comparative interpretation has detected some similar points between the ways the two disciplines define the real. The

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significance of these findings is the rapprochement the article brings about between a totally concrete science such as physics and a totally abstract field like philosophy.

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### References

- Aldea, E. (2011). *Magical realism and Deleuze: The indiscernability of difference in postcolonial literature*. London & New York, Continuum.
- Cassirer, E. (1936/1956). *Determinism and indeterminism in modern physics*. New Haven and London: Yale University Press.
- Deleuze, G., & Guattari, F. (1987). *A thousand Plateaus: Capitalism and schizophrenia*. Trans. by Brian Massumi. London and Minneapolis: University of Minnesota Press.
- Heisenberg, W. (1958). *Physics and philosophy: The revolution in modern science*. New York: Harper & Row.
- Karakostas, V. (2012). Realism and objectivism in quantum mechanics. [http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s10838-01209173-5&cm\\_mmc=event-articleAuthor--online-First--0](http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s10838-01209173-5&cm_mmc=event-articleAuthor--online-First--0). Accessed 07/11/2016. Pp. 1-20.
- Marmet, P. (Accessed 2016). Absurdities in modern physics: A solution. <http://www.newtonphysics.on.ca/heisenberg>.
- Nielsen, M. A., & Chuang, I. L. (2010). *Quantum computation and quantum information*. 10<sup>th</sup> Anniversary edition. Cambridge: Cambridge University Press.
- Ruyant, Q. (2015). Quantum mechanics and scientific realism. <https://scientiasalon.wordpress.com/.../quantum-mechanics-and-scientific...> (Accessed 06/29/2016).
- Schrodinger, E. (1935/1983). The present situation in quantum mechanics. *Naturwissenschaften* 22, 807-812, 823-828, 844-849. Reprinted in J. Wheeler & W. Zurek (Eds.), *Quantum theory and measurement*. Princeton: Princeton University Press.

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