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Weaknesses of Quantum Mechanics from the Islamic Perspectives Based on its Quantization Methods

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Abstract: This study highlights almost all the weaknesses of the Quantum Mechanics mentioned by several original contributors of the subject such as Einstein, Schroedinger, Feynman and many others. We also present almost all weaknesses of the existing quatization methods by Heisenberg, Schroedinger Dirac, Feynman and a few others including the latest method, the geometric quantization. The weaknesses are also presented from the Christian and Islamic perspectives.

Key words: Quantum Mechanics · Quantization Methods · General Critiques on Quantum Mechanics · Religious Perspectives of Quantum Mechanics

INTRODUCTION

Quantum mechanics was invented in the middle of the twentieth century because the classical mechanics and the earlier quantum theory later known as the Old Quantum Theory fails to or unsatisfactorily explain the black body radiation found at the end of the nineteenth century, the energy level of the hydrogen atom and the behaviour of an atomic particle known in the early twentieth century. It was first successfully formulated by Heisenberg [1] in 1925 and completed by Born and Jordan in the same year [2] and Born, Heisenberg and Jordan a year later [3]. The theory was referred to as the *matrix mechanics* (originally in German *matrixmechanik*) because all classical quantities, such as the position, the momentum and the Hamiltonian of a dynamical system transform into matrices (infinite matrices). The theory was not easily understood and accepted by the physicist's community at the time and hoping for a better and user friendly formulation. Then a year later came such a formulation by Schroedinger in his series of six papers [4-9] and his theory was referred to as the *wave mechanics* (originally in German, *wellenmechanik*), since everything becomes a kind of wave equation but with imaginary coefficients. It is the interpretations of the Schroedinger wave function which is equivalent to the eigenfunction of the Hamiltonian in the Heisenberg matrix mechanics that create interesting development and controversies in the two theories until today. About five year later the two theories popularly known as *quantum mechanics* (originally in German, *Quantenmechanik*) even though Born and Jordan [2] first used the term in 1925 for the matrix mechanics and a year earlier Born himself [10] had already used the term but for describing the Old Quantum Theory. The first English book containing the term quantum mechanics is written by the German immigrant physicist, Heitler [11] in 1928 but quantum mechanics became a prestigious field in the English speaking world after the publication of Dirac's book [12] in 1930, a product of his research in Germany in 1925-1928.

The earliest contributions in the interpretation of the wave function is Born [13, 14] in 1926 followed by Pauli [15] and Bohr [16]. These works spark the controversies in quantum mechanics. Einstien was the earliest proponent against the quantum mechanics and in 1927 there was a great debate between Einstein and Bohr (the great defender of quantum mechanics since the beginning) at the prestigious Solvay Conference [17, 18]. However the earliest strong and deep critique on quantum mechanics (QM) came from Albert Einstein (together with his students, Boris Padolsky and Nathan Rosen) through their famous thought experiment referred to as the EPR *gedanken* in which a strange situation could arise now known as the EPR paradox [19] after strengthening Eintein *et al.* [20]. This *gedanken* experiment generated a well-known deep unending debate between Albert Einstein [21-24] and Neil Bohr [25-27] which lead to the standard interpretation of quantum mechanics known as

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the Copenhagen interpretation, Copenhagenism or Bohrism. However Bohr's replies on many issues in this debate have never satisfied many physicists which in turn produced many schools of thought (interpretations) of QM which most of them are reviewed here from the Islamic perspectives which has never been done before.

Meanwhile there were many well-known founders of QM who gave some indications on the weaknesses of QM not only including the three pioneers, Werner Heisenberg, Erwin Schroedinger and Max Born, but some great scholars after them namely Richard Feynman, John Bell, David Bohm, Gell-Mann, Penrose and others mentioned appropriately later, presented in the first section of this article. Then we briefly describe the salient features of almost all quantization methods in QM and highlight almost all of their weaknesses. Most of the weaknesses have already been known long time ago but have not been presented to the "public" except perhaps in this millennium because QM has been overwhelmingly portrayed as the most successful physical science ever invented, as if QM is the ultimate theory of physics. Only since 1990, as described by Green [28], the essential features of the weaknesses of QM (and Relativity Theory) have been presented, but even that only known to those who have been following the development of the unification of QM and Relativity Theory. They believe that those "weak" elements in QM (and Relativity) have prevented the progress in the unification of the two theories and consequently a new paradigm in QM known as the "string theory" had emerged but we will not discuss this new paradigm here. However the "string theory" is not yet fully developed so that QM is still dominant and stands tall in physics curriculum throughout the world.

As far as the books on weaknesses/criticism/critique of/on QM are concerned, there is only a single book in English by Penrose [26] in 2016, one Polish book by Gryzinski [30] written 15 years earlier and a book by the author, Shaharir [31] written in Malay five years earlier than the above Penrose famous book. All criticisms so far are not viewed from a religious perspective which we are most interested in here in this paper except in the book by Shaharir [31] where it does contain some references to elements of Islamic belief which we extend them further here. Even in recent papers in 2014-2023 by Leifer [32] and Wolchover [33] both in 2014, Spencer [34] in 2018 and Hobson [35] in 2019, Ananthaswamy [36] and Miloš [37] both are in 2020, Matarese [38] in 2021 and Gleiser [39] in 2023, the criticisms are all on philosophical nature of quantum mechanics specifically on realism (or ontic intrpretation) and instrumentalism (epistemic philosophy) and none touches on perennial philosophy which interest us here. This is of course natural consequence of the secularism in science even though Criticism on knowledge or the existence of different nature of knowledge from perspective of a different culture (world view, cosmology, philosophy, ideology, religion, values and language) is not new especially in humanities and social sciences since 1960s. Thus, the concept of society itself is shown to be different within English, French and Arabic languages [40], the recognition of the role of a language in a conflict resolution [41], the difference of the concept of sustainability from the Islamic and non-Islamic (Western) perspectives [42] and similarly with the different understanding of the microfinance among female Islamic interpreneurs and others [43, 44], the difference in the rate of return in Islamic finance and non-Islamic finance [45], the difference in Islamic and non-islamic ethics practice in banking system [46], the difference in the American and Russian planning policies [47] and the need for incorporating even traditional religious values in an environmental policy [48].

In this article, we focus on the weaknesses of QM as indirectly mentioned by great scholars in this field and in the methods of quantization. A new feature in this critique is the evaluation of those two items above also based on their compatibility-incompatibility with religious values, especially in the Christian and Islamic cosmological doctrines (similar to the approach taken by the author [31, 49]).

Indications of the Weaknesses of the Quantum Theory from Various Scholars: Other than the occasion where Einstein *et al.*[19] had indicated the weaknesses of QM and hope that a new better theory would emerge, there were at many other occasions Einstein said something which imply the limitations or weaknesses of QM. For examples Wick [50] quoted Einstein's words that "QM does not bring newer the secret of old things". In Einstein's letter to Max Born 1919 quoted in Barrow [51], Einstein said that one should feel embarass by the success of QM because the theory is just like a Jesuit maxim "let the left hand does not know what the right hand gives" and in Einstein's letter to Lipkin 1952 quoted again in Barrow [52], Einstein said that QM reminds him to "a bit of delusion from a very intelligent paranoic who mixed elements of incoherent thought". Einstein also had commented the standard QM as "the Heisenberg-Bohr

tranquilizing philosophy - or religious? - is so delicately contrived that, for the time being it provides a gentle pillow for the true believer from which he cannot very easily be aroused" (quoted in Crease [53]). Feynman [54] said essentially that QM cannot explain the well-known light behaviour known as the interference phenomenon; Max Born (quoted in Wick [50]) said QM is "not yet the real thing" and "not able to bring us nearer to the secret of the old thing"; John Bell said that "QM does not explain things" and he believes that QM is "a simple and only temporary way and a better theory would emerge"(quoted in Davies and Brown [55]) and QM is "only a temporary story" (quoted in Davies and Brown [56]). Bohm, quoted in Davies and Brown [57], implicates that QM is value-laden when he said that QM "answered satisfactorily only to certain kind of questions and mathematical questions and therefore we should not trap in it just like many due to wrong assumptions on the nature of truth about mathematics" and Bohm further said that QM "especially could not answer many philosophical questions which are related to insight of the issues" in QM. Oskar Kline, quoted in Friedman [58], well known for a pioneer in introducing 5 dimensional space-time for the first time in his bold effort to unify QM and Relativity Theory was sceptical about QM after his failure in uniting the two theories.

More recent, Peres and Zurek [59] and Malin [60] said that QM is not a valid universal knowledge. Even though this type of statement applies to all sciences but for QM it is significant since its image has been regarded as the last theory in physics even though presently there is a public noise that physicists have found "the theory of everything" not through QM but the string theory [28]. Kaku [61] showed "among stupid theories proposed in USA, quantum mechanics is the most stupid because there is yet an object to be reached by this theory and has never been questioned". Penrose [62], Hawking [63] and Smolin [64], are hoping for a better theory than the present QM. In fact, Penrose, in a recent interview by Kruglinski and Chanarin [65], said that QM is wrong!

There are more recent criticisms from the well-known physicists including a few Nobel laureates. Weinberg, a Noble laureate 1979 in the unification of the weak force and the electromagnetic interaction between elementary particles, through his article [66] in 2017 expresses his unsatisfactory feeling on the nature of probability, problem of measurement and the nonlocality in quantum mechanics. He think that the present theory of quantum mechanics needs some modifications or corrections if not a replacement even though in the later suggestion he quoted Shakespeare in his *Twelfth Night:* Act 2, Scene 2. Viola: "O time, thou must untangle this, not I. (It is too hard a knot for me to untie)." Another Noble laureate 1999 in the quantum structure of electroweak interaction,'t Hooft, quoted in Wolchover [33] in 2014, believes the quantum mechanics is incomplete but not due to its probabilistic nature and the famous reasons given by Einstein *et al.* [19] thus he also claimed to be dislike an alternative theory of quantum mechanics based on hidden variables such as the pilot wave theory by Bohm [67]. Wilczek, a Nobel laureate 2004 in the behaviour of quarks, believes that the standard model in quantum atomic theory is incomplete and suggests a new theory which he called the Core Theory (Quoted in Wolchover [33]). Leggett, a Nobel laureate 2003 in low temperature and superfluidity, believes in the possible replacement of the standard quantum mechanics by the pilot wave theory [67] (Quoted in Wolchover [33]). Goldstein, a professor of mathematics, physics and philosophy at Rutgers University, also dislikes the standard quantum mechanics but a supporter of pilot-wave theory and blames the noncritical attitudes of the physicists towards the quantum mechanics is due to "decades of indoctrination." He believes that at this stage, those researchers in derailing the standard quantum mechanics risk their careers [33].

There was a discussion on the direction of new development in QM in the 21st century by a group of respected scholars in QM whereby the group shows the weaknesses of the present MQ [68]. More explicitly, Brannen [69] produces a list of six items of weaknessess of QM which he expressed it as "a difficulty in comprehending reality", namely the duality of wave-particles; the nature of time (proper time versus strange time), linearity versus nonlinearity, randomness versus predictability, causality versus entanglement and wave mechanics versus operator formalism. More recent, Helrich [70], Laszlo [71] and Schafer [72, 73] present the limitations of the present quantum theory whereas Klein [74] and Schafer [75] present *conflicts between quantum theory and religion in general* as such, naturally, it is not as specific as we are going to discuss this issue here. Grinbaum [76] and Laszlo [71] discuss the need for a reconstructing quantum theory and a new paradigm in quantum theory respectively. Perhaps Lewis [77] reveals a much more interesting and startling weakness of QM compared with others when he exposes the presence of conspiracy theories in quantum mechanics.

A Brief on Quantization Methods: The earliest quantization method is a product of German physicist, Heisenberg [1] and completed by Born and Jordan [12] and Born *et al*. [13], known as the "matrix mechanics", followed by another German physicist, Schroedinger [2, 3, 4, 5, 6, 7], with a method known as the "wave mechanics" and interpreted by Born [14], Pauli [15] and Bohr [17]. At the earlier stages of these two methods of quantization, there were strong criticisms not only to each other and their respective followers, but from the physicists community in general, regarding what they term as the *anchaulich* or *unanchaulich* (visualisableor unvisualisable) of each of the theories [53] but Bohr was able to mediate the two through his well known interpretation of QM, the Copenhagen interpretation [16, 25-27]. Then came a few more methods of quantization, partly to improve the two methods so that the quantization is more *anchaulich* (visualisable), more natural, more practical and more applicable to wider cases which correspond to awider class of classical dynamical systems. The methods are by Dirac [11] via a homomorphism of the Poisson's barackets in classical mechanics onto commutation relations operators in a Hilbert space, Feynman [78] via a hypothesis of a "path integral" which is analogous to the stochastic integral for a classical diffusion,Schwinger in 1950s and 1960s works found in his antology [79] via a hypothesis of a quantal action integral analogous to the "action integral" in the classical mechanics, Nelson [80, 81] and DeWitt-Morette and Elworthy [82, 83] via their own different stochasticprocesses analogous to the equation for a classical diffusion process, Kostant [84] and Soriau [85] via a geometric method as an extension of classical mechanics on a symplectic manifold and quite differently via fully axiomatization method pioneered by von Neumann [86] and its improvements notably by Birkhoff and von Neumann [87] and others [88-93].

Weaknesses of the Axiomatic Quantization Method: The main weakness of the fully axiomatic method is of course its dependency on the non-axiomatic methods listed above notably the Heisenberg, Schroedinger and Dirac quantization methods and hence could not produce a new finding or a more powerful method than those non-axiomatic quantization methods. This is besides the fact that the axiomatic method is restricted by the well known Godel's Proof.

It is true that the axiomatic approaches manage to make a significant leap ahead due to the establishment of the biquaternion method by Conte [93] and another axiomatic approach by Bub [91] who makes use of lattices and operators. But the "Godel proof" is shown to manifests itself in QM as described by Aerts [94, 95]. In these writings also, he shows that in the present mathematical structure of QM, it is impossible to describe two separated quantum systems, but occur conversely if a more general theory which includes the present QM and classical mechanics can be formulated. He shows that the axioms of QM cause the impossibility of description of the separated system.

Regarding the approach in Quantum field theory (QFT) axiomatically, the first approach was formulated by Wightman in 1950s (but published in Streater and Wightman [96]). The progress up to the first half of 1970s is in Streater [97] and up to 1998 is available in Buchholz [98] in which both authors highlight the difficulty of axiomatization on the gauge-field and the curve space-time. Besides similar problem occurs as in the axiomatic approach of QM, Buchholz [98] also made a survey on this matter and shows future direction of development which at the same time shows the weaknesses of the QFT. For example, one of the weaknesses of the axioms of the present QFT is that the theory does not produce the classical field theory but the QFT is developed based on the classical field theory; even though the classical field theory is well known for its weaknesses! Actually almost every method of quantization is developed based on classical mechanics which is known for its shortcomings! This is one of the general weaknesses of quantization as discussed by Smolin [64] and more recently by Bokulich [99]. A latest development in the axiomatization of the QFT is found in Hollands and Wald [100] where some of the problems mentioned above have been addressed partially and naturally they have suggested further direction of research for overcoming the problems.

The Weaknesses of the Feynman's Method of Quantization: The main problem with each of those non-axiomatic quantization methods *is its range of applicability*. The most successful method is no doubt the Feynman's method but it is well known for its controversy of maneuvering the infinities via so called renormalisation procedure which is unsatisfied by many (see for examples, Anselmi [101] and Teller [102, 103]). Furthermore, its "success" in a quantization of a hydrogen atom is not only relatively new as shown by Ho and Inomata [104], but still not final as shown by Shaharir [105], whereas its "improvements" by Steiner [106] and Junker and Inomata [107] are shown by Kleinert [108-110] to have flaws and inconsistencies.

Another fundamental quantity in the Feynman's method of quantization which is most unsatisfactory is "time" because the most popular and pragmatic assumption taken by physicists in this field is that "time" is a complex number. Thus "time" is no longer a well ordered quantities (numbers) contrary to what we have been accustomed to; and hence past, present and future are no longer meaningful. This is incompatible with the Christian and Islamic concept of time as discussed by Whitehead [111], Bergson [112], Iqbal [113] and Shaharir [49]. However this may be celebrated by some especially among atheists or areligious people and they even more excited when Stephen Hawking reveals their model of universe [114] in a stylistic way through his renowned historical bestselling book [115]. Using "time" as a complex number (more precisely, an analytic continuation of time) he shows that our universe is finite but without boundary in the 4-dimensional space-time (analogous to a sphere in our 3-dimensional space) so that the question of the starting point of the Big Bang (the beginning of this universe) does not exist, i.e. there was no beginning of the creation of this universe! This is of course not acceptable by many believers, the *ahl al-Kitab* (Christians and Jews) and Muslims. Incidently, Penrose [62] and Smolin [64] point out that Hartle and Hawking [114] theory mentioned above is mathematically unacceptable (wrong). It is not known whether these criticisms were recognized by Hawking or not but Hawking did announce his mistakes in his theory of Black Holes at the General Relativity Conference in Belfast [116] in 2004 and this effects his controversial models of universe and he had modified the model a few times since then.

Actually earlier, perhaps there was a happier period not only for areligious cosmologists but also for religious scientists in general when Hawking and Ellis [117] produced a theorem and improved by Hawking and Penrose [118] which would eliminate the earliest implausible hypothesis of an infinite density of a material point in order for the occurrence of the Big Bang (the well known controversial phenomenon invented to explain the beginning of of this universe using quantum theory); and the theorem (which is also discussed by Barrow [51] which says that this universe begins by chance without any reason and without anything. The hypotheses of the theorem are the Relativity Theory is correct, but the time travel is impossible and "the gravity always attracts and the matter and radiations are sufficient". It is the last part of the conclusion of the above theorem that could pacify a religious person but the first two part of the hypothesis of the theorem, "universe begins by chance without any reason" are obviously incompatible with the Christian and Islamic cosmological doctrines. But since 1978 there was strong evidence that two of the hypotheses of the theorem do not hold, namely the Relativity Theory itself and the existence of repulsive gravity (Barrow [52]). Perhaps this is the main reason for Hartle and Hawking produced their blasphemous theorem in 1983 discussed earlier [114]. Therefore there is a big challenge for a religious cosmologists (Christianists and Islamists) to produce a similar but much better theorem. Until then the present cosmology is certainly incompatible with the religious teachings and values and hence appropriately regarded by serious islamist and *ahlil Kitabis* as a big weakness of the current quantum cosmology.

The existence of the "path integral" in the Feynman's method of quantization has long been a subject of concerned by many mathematicians. One of the more recent attempts to improve the situation were formulated by Shaharirand his coresearchers [119-127] but their success is still limited. We believe the problem is unsolved until today. In this relation, we also believe that it is the Feynman's hypothesis on his path integral itself that must be modified or replaced since the present hypothesis is not fully in accordance with the Christian-Islamic cosmological doctrine which should be internalized in any law of physics, namely the hypothesis that the God executes His law with a least effort of action (as stated in the "al-Haytham-Maupertuis-Hamilton least action principle" in classical mechanics). This principle is not fully realized in the Feynman's integral hypothesis as discussed in Shaharir [128-131].

There is an interpretation of the Feynman's quantization method in which the infinite paths of a particle under consideration means the particle can be anywhere simultaneously. This interpretation is used to explain the interference phenomenon [28]. We have not seen this interpretation is being used to explain or reason out the self-cloning phenomenon among *shufists* (or sufists), unlike the Many World Interpretation of QM. Even if there is, we believe that the identification is hasty and improper. In fact we regard this as another weakness of the Feynman's quantization method.

The Weaknesses of the Schroedinger's Method of Quantization: In the Schroedinger's method of quantization, the assumption of wave-particle dualism is taken from the de Broglie formula. This is the actual origin of many paradoxes in QM which have not been resolved till today. Bohr [16, 25-27] just simply introduced his "Complementarity Principle" to cover the problem.

Thus Brannen [70] reveals that he keeps his feeling of uneasiness toward this situation and hope that some day he or some one else could rectify it and we believe he represents a significant number of other physicists. Some others may well strongly support Tisza [132] who suggests that one should abandon the duality principle and adopt what he called "wave simplex". Tegmark and Wheeler [133] suggest to reconstruct QM which could maintain the determinism of the wave function and make those discrete particles in a more localized wave states so that interferences and interactions are abolished by the decoherence which become all superpositions of wave functions dissipated by interactions with their environments. Most recent discussion on the "divergent views" on the complementarity principle is found in Camilleri [134].

There is another indication of the weakness of the Schroedinger quantization method, namely its assumption that the wave function represents all the behavior and properties of an atom. This assumption is said [135-137] to be influenced by Hinduism and celebrated by many popular writers, notably Capra [138]. Thus it is just a coincident if anything at all if the Schroedinger's quantization method ("wave mechanic") happens to be compatible with other religions, in particular Islam or Christian teachings. Thus, even though some implications of the Schroedinger' quatization seems to be compatible with the Islamic or Christian teachings/values [139-141], these should not befactors for the Islamists or Christianists to be passive or not critical towards "wave mechanics". Therefore, for an Islamist or a Christianist theoretical physicist to simply agree and more inappropriate to justify religiously, towards the validity of "the wave collapse", "the Copenhagen interpretation", "the complementarity principle", "the non-classical probability laws in the wave mechanics", "the entanglement" and "the Schroedinger's cat", just to mention some of phenomena arise from the "wave mechanics", or to ignore the EPR (Einstein-Padolsky-Rosen) [19] *gedanken*or paradox. These phenomena are regarded by many theoretical physicists to be the weaknesses of the "wave mechnics" but their arguments are not based on any religious teachings or values. Another specific weakness of the "wave mechanics" is discussed below.

The Imbalanced Role of Wave Functions and Operators: In Schrodinger method of quantization also, the focus is on the "wave function"; whereas in Heisenberg, Dirac and axiomatic methods of quantization the focus are on operators on a Hilbert space and thus the methods are known as operator formalisms[(1)]. From calculational perspective, operator formalisms seem to have an upper hand than the wave mechanics formulation, even though the wave approach seems to be more realistic (*anchaulich*) in describing this universe. In fact Penrose [62] regards the "wave function" is the only reality in QM which is just the opposite of Bohr position. Brannen [70] raises this imbalanced situation between the operator and wave formulation methods of QM. He is also not happy that the wave function is more useful in Dirac's electron theory whereby the new quantities involve known as spinors come into play which acts on this physical space without the aether; the role of operators are minimal. All these state of affairs can be considered as weaknesses of quantization methods.

The Weaknesses of the Geometric Quantization: Meanwhile the most sophisticated method of quantization, the Kostant-Souriou geometric quantization [85-86] is still lag behind in its range of applicability [106]. Certainly other methods of quantization are ahead of the geometric method, even relative to the axiomatic method discussed in first subsection above. The weaknesses of the geometric quantization, besides it makes use of the geometry, the symplectic geometry, which underlies the classical mechanics, are just like the Relativity Theory, lies in the quntization theory which is materialistic and physicalistic value-laden, the values which are incompatible with Christianity and Islam. This is due to the fact that the symplecticgeometry is dictated or determined by matter and physical phenomena only (materialism and physicalism). Thus the Islamic and Christianic physicists naturally should not be happy with this method of quatization.

General Weaknesses: The other weaknesses of the QM, similar to the other scientific theories from the West is that the QM inherits values which are foreign (incompatible, unsuitable or in contradiction with nonwestern values, in particular Islam). Peres and Zurek [59] and Malin [60] indeed raise an analogous problem even though its scope does not include any value system. We have shown this feature in the Feynman's, Schroedinger's and the geometric methods of quantization and this of needs another separate discussion regarding the weaknesses of all known school of thoughts in QM.

CONCLUSION

We have highlighted almost all known weaknesses of quantization methods based on internal structure of each method; and new weaknesses based on external cosmological doctrines derived from Christianity and Islam.

REFERENCES

1. Heisenberg, W., 1925. Ueber quantentheoretische umdeutung kinematischeer und mechaniecher beziehungen. Zeitschrifr fur Physik, 33: 879-893. English trans. “Quantum Theoretical Re-Interpretation of Kinematic and Mechanical Relations”, in Sources of Quantum Mechanics, ed., van der Waerden, B. L. 1967. Amsterdam: North Holland, pp: 261.
2. Born, M. and P. Jordan, 1925. Zur Quantenmechanik. Zeitschrift für Physik, 34: 858-888. Reprinted in Souces of Quantum Mechanics, ed. van der Waerden, B. L. 1967. New York: Dover Pub, 277-306. English trans. "On Quantum Mechanics", Delphenich D.H., http://www.neo-classical-physics.info/ uploads/ 3/4/ 3/6/ 34363841/ born_and_jordan_-_qm_1.pdf (Accessed 20 May 2022); Availabale also in The 1925 Born and Jordan paper “On quantum mechanics”, Fedak, W.A. and J.J. Prentis, 2009. American Journal of Physics, 77: 128-139.
3. Born, M., H. Heisenberg and P. Jordan, 1926. Zur Quantenmechanik. II. Zeitschrift für Physik, 35(8-9): 557-615. Reprinted in Souces of Quantum Mechanics, ed. van der Waerden, B.L. 1967. New York: Dover Pub, 321-386. English trans. "On Quantum Mechanics II", http://fisica.ciens.ucv.ve/~svincenz/SQM333.pdf (Accessed 20 May 2022).
4. Schroedinger, E., 1926. Quantisierungals Eigenwertproblem (ErsteMitteilung). Annalen der Physik, 4(79): 361-376. English trans. “Quantisation as a problem of proper values. Part I” in his Collected Papers on Wave Mechanics. (trans by Shearer, J.F. on Schroedinger’s Abhandlungenzur Wellenmechanic, Johan Ambrosius Barth 1928). London: Blackie and Son Ltd, 1927; N.York: Chelsea Pub’ing. Co., 2nd ed. 1978, 1-12.
5. Schroedinger, E., 1926. Quantisierungals Eigenwertproblem (Zweite Mitteilung). Annalen der Physik,4 (79): 489-527. English trans. “Quantisation as a problem of proper values. Part II” in his Collected Papers on Wave Mechanics. (trans. by Shearer, J. F. on Schroedinger’sAbhandlungenzur Wellenmechanic, Johan Ambrosius Barth 1928). London: Blackie and Son Ltd 1927; N.York: Chelsea Pub’ing. Co. 2nd ed. 1978, 13-40.
6. Schroedinger, E., 1926. Quantisierungals Eigenwertproblem (Dritte Mitteilung: Störungstheorie, mit Anwendung auf den Starkeffekt der Balmerlinien). Annalen der Physik, 4(80): 437-490. English trans. “Quantisation as a problem of proper values. Part III” in his Collected Papers on Wave Mechanics (trans by Shearer, J. F. on Schroedinger’s Abhandlungenzur Wellenmechanic, Johan Ambrosius Barth 1928). London: N. York: Blackie and Son Ltd 1927; Chelsea Pub’ing. Co. 2nd ed. 1978, 62-101.
7. Schroedinger, E., 1926. Quantisierungals Eigenwertproblem (Vierte Mitteilung). Annalen der Physik, 4(81): 109-139. English trans. “Quantisation as a problem of proper values. Part IV” in his Collected Papers on Wave Mechanics (trans by Shearer, J. F. on Schroedinger’s Abhandlungenzur Wellenmechanic, Johan Ambrosius Barth 1928). London: Blackie and Son Ltd 1927; N.York: Chelsea Pub’ing. Co. 2nd ed. 1978, 102-123.
8. Schroedinger, E., 1926. Der stetige Übergang von der Mikrozur Makromechanik. Die Naturwissenschaften, 14: 664-666. English trans. “The continuous transition from micro to macro-mechanics”in his Collected Papers on Wave Mechanics (trans by Shearer, J.F. on Schroedinger’s Abhandlungenzur Wellenmechanic, Johan Ambrosius Barth 1928). London: Blackie and Son Ltd 1927; N.York: Chelsea Pub’ing. Co. 2nd ed. 1978, 41-44.
9. Schroedinger, E., 1926. An Undulatory Theory of the Mechanics of Atoms and Molecules. Phys. Rev., 28(6): 1049-1070.
10. Born, M., 1924. Uber Quantenmechanik. Zeitschrift für Physik, 26: 379-39.
11. Heitler, W., 1928. The Quantum Theory of Radiation. Oxford, UK: Oxford Univ. Press.
12. Dirac, P.A.M., 1930/1982. The Principles of Quantum Mechanics, 4th ed. Reprinted 1982. Oxford, UK: Oxford Univ. Press. First ed. 1930.

13. Born, M., 1926. Zur Quantenmechanik der Stoßvorgänge.Zeitschrift für Physik, 37(12): 863-867.
14. Born, M., 1926. Physical aspects of quantum mechanics. Nature, 119: 354-357.
15. Pauli, W., 1927. Uber Gasentartung und Paramagnetismus. Zeitschrift für Physik, 41(2): 81-102.
16. Bohr, N., 1927. The quantum postulate and the recent development of atomic theory. Atti del Congresso Internazionaledei Fisici (Como 1927). Reprinted in Bohr [25]
17. Nolte, D.D., 2020. The Solvay Debates: Einstein versus Bohr. Galoleo Unbound. https://galileo-unbound.blog/2020/06/15/the-solvay-debates-einstein-versus-bohr/ (Accessed 20 April 2023)
18. Kumar, M., 2007. Quantum: Einstein, Bohr and the Great Debate about the Nature of Reality. Notting Hill: Fourth Estate.
19. Einstein, A., B. Podolsky and N. Rosen, 1935. Can quantum mechanical description of physical reality be considerd complete? Physical Review, 47: 777-780
20. Einstein, A., R.C. Tolman and B. Podolsky, 1931. Knowledge of past and future in quantum mechanics. Physical Review, 37: 780-781.
21. Einstein, A., 1936. Physik und Realität. The Journal of the Franklin Institute: Devoted to Science and the Mechanic Art, 221(3): 313-347. Engl. transl. Physics and Reality, Piccard, J. in the same journal, 349-382.
22. Einstein, A., 1940. The fundaments of theoretical physics. Science, Washington, D. C., May 24, 1940. file:///C:/Users/riram/Downloads/pdf%20(1).pdf (accessed 20 Jan. 2023).
23. Einstein, A., 1948. Quantenmechanik und Wirklichkeit. Dialectica, 2: 320-324.
24. Einstein, A., 1949. Reply to criticism. Remarks concerning the essays brought together in this co-operative volume. In Albert Einstein-Philosopher Scientist, ed., Schilpp, P.A., 1951, 2nd ed. New York: Tudor Publishing, pp: 671-72.
25. Bohr, N., 1934. Atomic Theory and The Discription of Nature. Cambridge, UK: Cambridge Univ. Press
26. Bohr, N., 1935. Can quantum-mechanical description of physical reality be considered complete? Phys. Rev., 48: 696-702
27. Bohr, N., 1937. Causality and complementarity. Philosophy of Science, 4: 289-298.
28. Greene, B., 1999. The Elegant Universe. Superstrings, Hidden Dimensions and the Quest for the Ultimate Theory. New York: Vintage Series, Random House Inc.,
29. Penrose, R., 2003/2016. Fashion, Faith and Fantasy in the New Physics of the Universe. Princeton, USA: Princeton Univ. Press. Originally a lecture presented at the University in 2003.
30. Gryzinski, M., 2001. Sprawaatomu.Warszawa: Homo-Sapiens (In Polish).
31. Shaharir, B.M.Z., 2011. Kritikan Teori Kenisbian Einstein dan Teori Quantum.Petaling Jaya, Selangor, Malaysia: Akademi Sains Islam Malaysia (ASASI). (In Malay).
32. Leifer, M.S., 2014. Is the quantum state real; An extended review of psi-ontology theorems. Quanta, 3(1): 67-155.
33. Wolchover, N., 2014. Have We Been Interpreting Quantum Mechanics Wrong This Whole Time?XM Live Education. Science. June 30, 2014. https://www.wired.com/2014/06/the-new-quantum-reality/ (Accessed 20 March 2023)
34. Spencer, H., 2018. Problems of Quantum Mechanics: (A Natural Philosophical Critique). https:// www.researchgate.net/ publication/ 329452760_Problems_of_QuantumMechanics_A_ Natural_Philosophical_Critique (Accessed 20 March 2023)
35. Hobson, A., 2019. Realist Analysis of Six Controversial Quantum Issues. In A Centenary Festschrift, Bunge, M. Springer Nature Switzerland, pp: 32.
36. Ananthaswamy, A., 2020. A new theorem maps out the limits of quantum physics. Quanta Magazine. Dec. 3, 2020. https://www.quantamagazine.org/a-new-theorem-maps-out-the-limits-of-quantum-physics-20201203/ (Accessed 20 May 2023).
37. Miloš, L. V., 2012. The assumption in Bell's inequalities and entanglement problem. Journal of Computational and Theoretical Nanoscience, 9(12): 2018-2020.
38. Matarese, V., 2021. On The Methodological Arguments for Wave-Function Realism. International Studies in the Philosophy of Science, 34(2): 63-80.
39. Gleiser, M., 2013. The weirdness of quantum mechanics forces scientists to confront philosophy. Big Think.8 February 2023. https://bigthink.com/13-8/quantum-mechanics-philosophy/ (Accessed 20 May 2023).
40. Barbouch, L. 2015. The Origins of the Concept of Society in Arabic, English and French Languages: A Conceptual Analysis of their Convergence and Divergence. Middle-East Journal of Scientific Research, 23(6): 1137-1144.

41. Cyril, A., 2019. The Role of Language in Conflict Resolution in Nigeria: Implication for Translation. Middle-East Journal of Scientific Research, 27(4): 306-311.
42. Azila, A.S. and A. Alias, 2015. Contextualising the Islamic Fundamentals in the Contemporary Concepts of Sustainability, Livability and Quality of Life in the Built Environment. Middle-East Journal of Scientific Research, 23(6): 1249-1256.
43. Seethaletchumy, T., M. Saravanan and J.J. Kew, 2015. Islamic Microfinance Participation among Women Entrepreneurs in Malaysia: A Conceptual Framework. Middle-East Journal of Scientific Research, 23(9): 2016-2022.
44. Rosmini, O. and G. Zeinab, 2015. Beyond Romancing Micro Finance: How Could Female Entrepreneurs Leap? Middle-East Journal of Scientific Research, 23(12): 2848.
45. Yousaf, R., L. Khalid, R. Tariq, T. Sultan and S. ul Huda, 2015. Impact of Rate of Return (Interest Rate) on Islamic Methods of Finance: Evidence from Pakistan Middle-East Journal of Scientific Research, 23(5): 817-822.
46. Siti Khadijah, A.M., N. Kamaluddin and A.S.A.P. Salin, 2015. Islamic Work Ethics (IWE) Practice among Employees of Banking Sectors. Middle-East Journal of Scientific Research, 23(5): 924-931.
47. Sentsov, A., A. Bogdan, M. Kuimova and N. Tumakova. 2015. The Arctic Region: A New Model of the Future Planning. Middle-East Journal of Scientific Research, 23(2): 318-321.
48. Okoro and K. Nwannennaya. 2020. African (IGBO) Traditional Religious Thoughts and Modern Nigerian Environmental Crisis: A Reconsideration. Middle-East Journal of Scientific Research, 28(3): 240-253.
49. Shaharir, B.M.Z., 2008. Some weaknesses of the Relativity Theory on the basis of cosmological doctrines. In Current Issues of Physics in Malaysia. AIP Conference Proceedings, eds., Senin, H.B., G. Carini., J. Abdullah and D.A. Bradley. American Institute of Physics, pp: 75-83.
50. Wick, D., 1995. The Infamous Boundary. Seven Decades of Controversy in Quantum Physics. Basel, Swetz.: Birkhauser, pp: 48.
51. Barrow, J.D., 2001. The Book of Nothing : Vacuums, Voids and the Latest Ideas about the Origins of the Universe. New York:Vintage, pp: 9.
52. Barrow, J.D., 2001. The Book of Nothing : Vacuums, Voids and the Latest Ideas about the Origins of the Universe. New York:Vintage, pp: 204.
53. Crease, R.P., 2009. A Brief Guide toThe Great Equations. A Hunt for Cosmic Beauty in Numbers. London: Constable & Robinson, pp: 258.
54. Wick D., 1995. The Infamous Boundary. Seven Decades of Controversy in Quantum Physics. Basel, Swetz.: Birkhauser, pp: 133.
55. Davies, P.C.W. and J.R. Brown (Eds.), 1993. The Ghost in the Atom. Cambridge, UK: Cambridge Univ. Press, pp: 51-53.
56. Davies, P.C.W. and J.R. Brown (Eds.), 1993. The Ghost in the Atom. Cambridge, UK: Cambridge Univ. Press, pp: 124.
57. Davies, P.C.W. and J.R. Brown (Eds.), 1993. The Ghost in the Atom. Cambridge, UK: Cambridge Univ. Press, 124: 134 .
58. Friedman, R.M., 2002. Quantum theory and the Nobel Prize. Physics World. August. http:// physicsweb.org/ articles/world/15/8/7/1. (Accessed 25 June, 2022)
59. Peres, A. and W.H. Zurek, 1981. Is quantum theory universally valid? Print-81-0144 (TEXAS).
60. Malin, S., 2001. Nature Loves to Hides: Quantum Physics and Reality. A Western Perspective. Oxford, UK: Oxford Univ. Press.
61. Kaku, M., 1994. Hyperspace: A Scientific Odyssey Through Parallel Universes, Time Warps and The Tenth Dimension. Oxford: Oxford University Press, pp: 262.
62. Penrose, R., 2004. The Road to Reality; A Complete Guide to the Laws of the Universe. London: Jonathan Cape.
63. Chown, M., 2007. Quantum Theory cannot Hurt You. London: Faber and Faber.
64. Smolin, L., 2006. The Trouble with Physics. New York: Penguin.
65. Kruglinski, S. and O. Chanarin, 2009. Discover Interview: Roger Penrose Says Physics Is Wrong, From String Theory to Quantum Mechanics. Discover, Sept 2009. http:// discovermagazine.com/ 2009/sep/06-discover-interview-roger-penrose-says-physics-is-wrong-string-theory-quantum-mechanics (Accessed 20 July 2022).
66. Weinberg, S., 2017. The Trouble with Quantum Mechanics.The New York Review. January 19, 2017. https://www.nybooks.com/articles/2017/01/19/trouble-with-quantum-mechanics/ (Accessed 20 May 2023)
67. Bohm, D., 1952. A Suggested Interpretation of the Quantum Theory in Terms of 'Hidden' Variables, I and II. Physical Review, 85(2): 166-193. doi:10.1103/PhysRev.85.166

68. Elitzur, A., S. Dolev and N. Kolenda. (Eds.), 2005. Quo Vadis Quantum Mechanics? Ontaqrio: Springer
69. Brannen, C., 2003. Classical quantum mechanics. http://brannenworks.com/Quant.html. (Accessed 13 June 2022)
70. Helrich, C.S., 2006. On the limitations and promise of quantum theory for comprehension of human knowledge and consciousness. Zygon, 41(3): 543-566.
71. Laszlo, E., 2006. Quantum and consciousness: In search of a new paradigm. Zygon, 41(3): 533-542.
72. Schafer, L., 2006. A response to Ervin Laszlo: Quantum and consciousness. Zygon, 41(3): 573-582.
73. Schafer, L., 2006. A response to Carl Helrich: The limitations and promise of quantum theory. Zygon, 41(3): 583-592.
74. Klein, S., 2006. Order from virtual states: A dialogue on the relevance of quantum theory to religion. Zygon, 41(3): 567-572.
75. Schafer, L., 2006. A response to Staley Klein: A dialogue on the relevance of quantum theory to religion. Zygon, 41(3): 593-598.
76. Grinbaum, A., 2007. Reconstruction of quantum theory. The British Jour. for the Philosophy of Science, 58(3): 387-408.
77. Lewis, P.J., 2006. Conspiracy theories of quantum mechanics. The British Journal for the Philosophy of Science, 57: 359-381.
78. Feynman, R.P., 1948. Space-time approache to nonrelativistic quantum mechanics. Rev. Mod. Phys., 20: 367-387.
79. Schwinger, J., 1970. Quantum kinematics and Dynamics. New York: Benjamin.
80. Nelson, E. 1967. Dynamical Theories of Brownian Motions. Princeton: Princeton Univ. Press.
81. Nelson, E., 1984. Quantum Fluctuations. Princeton: Princeton Univ. Press.
82. DeWitt-Morrete, C. and D. Elworthy, 1978. Stochastic Differential Equations. Lecture Notes and Problems. Mimeograph. Centre of Relativity, Univ. of Texas, Austin USA.
83. Elworthy, D., 1982. Stochastic Differential Equation on Manifolds. Cambridge, UK: Cambridge Univ. Press.
84. Kostant, B., 1970. Quantisation and Unitary Representations. Lecture Notes in Maths. Vol 170. Springer, 87-208).
85. Souriau, J.M., 1970. Structure des SystemesDynamiques. Paris: Dunod.
86. Von Neumann, J., 1932/1955. Mathematical Foundation of Quantum Mechanics. Princeton: Princeton Univ. Press. Trans. 1955 from the original work 1932 in German.
87. Birkhoff, G. and J. Von Neumann, 1936. The Logic of Quantum Mechanics. The Annals of Mathematics, 37(4): 823-843.
88. Mackey, G., 1963. Mathematical Foundation of Quantum Mechanics. New York: Benjamin.
89. Piron, C., 1976. Foundations of Quantum Physics. New York: Benjamin
90. Ludwig, G., 1983. Mathematical Foundation of Quantum Mechanics. London: Springer.
91. Bub, J., 1997. Interpreting the Quantum World. Oxford, UK: Cambridge Univ. Press.
92. Omnes, R., 1999. Understanding Quantum Mechanics. Princeton: Princeton University Press.
93. Conte, E., 2000. Biquaternion Quantum Mechanics. Bologna, Italy: Pitagora Editrice.
94. Aerts, D., 2000. The description of joint quantum entities and the formulation of a paradox. International Journal of Theoretical Physics, 39:485-496. http://uk.arxiv.org/abs/quant-ph/0105106. (Accessed 2 June, 2022).
95. Aerts, D., 2001. The separated product and failing quantum axioms.http://www.vub.ac.be/CLEA/aerts/publications/separated_product.html. (Accessed 4 June, 2022)
96. Streater, R.F. and A.S. Wightman, 1964. PCT, Spin and Statistics and All That. N. York: Benjamin.
97. Streater, R.F., 1975. Outline of Axiomatic Relativistic Quantum Field Theory. Reports on Progress in Physics, 38: 771-846.
98. Buchholz, D., 2000. Current trends in axiomatic quantum field theory.Lect.Notes Phys., 558: 43-64. http:// arxiv. org/abs/hep-th/9811233. (Accessed 5 June 2022).
99. Bokulich, A., 2008. Can classical structures explain quantum phenomena? The British Jour. for the Philosophy of Science, 59(2): 217-235.
100. Hollands, S. and R.M. Wald, 2010. Axiomatic quantum field theory in curved spacetime. Commun. Math. Phys., 293: 85-125.
101. Anselmi, D., 1998. A new perspective on the philosophical implications of quantum field theory. Internet. "Weaknesses of quantum mechanics" (Accessed 15 July 2022).
102. Teller, P., 1989. Infinite renormalization. Philosophy of Science, 56: 238.

103. Teller, P., 1990. Prolegomenon to a proper interpretation of quantum field theory. Philosophy of Science, 57: 594.
104. Ho, R. and A. Inomata, 1982. Exact-Path-Integral Treatment of the Hydrogen Atom.Phys. Rev. Lett., 48: 231-234.
105. Shaharir, B.M.Z., 2005. Dinamik Sebutir-Dua Zarah Atom. Terserlahnya Metafizik. Bangi, Selangor, Malaysia: PPSM, Universiti Kebangsaan Malaysia. (In Malay)
106. Steiner, F., 1984. Exact path integral treatment of the hydrogen atom. Phys. Lett., 106A(356): 363-367.
107. Junker, G. and A. Inomata, 1986. Path Integral on S3 and its Application to the Rosen-Morse Oscillator. In Path Integrals from meV To MeV, eds.,Gutzwiller, M.C., A. Inomata, J. R. Klauder and L. Streit. Singapore: World Scientific, pp: 315-334.
108. Kleinert, H., 1987. How to do the Time-Sliced Path Integral of H-Atom. Phys. Lett., A120: 361-366. http://www.physik.fu-berlin.de/~kleinert/kleiner_re202/ node1.html. (Accessed 8 June 2022)
109. Kleinert, H., 1989. Path Collapse in Feynman Formula - Stable Path Integral Formula from Local Reparametrization Invariant Amplitude. Phys. Lett, B224: 313-318.
110. Kleinert, H., 1990/2004. Path Integrals in Quantum Mechanics, Statistics, Polymer Physics and Financial Markets, 4th ed. 2004 (1st ed. 1990). Singapore: World Scientific.
111. Whitehead, A.N., 1922/2002. The Principle of Relativity with Applications to Physical Science, reprint 2002 (1922 ed.). Cambridge, UK: Cambridge Univ. Press.
112. Bergson, H., 1921. Duree et samultaneitte: a propose de la theoried' Einstein septièmeédition, Paris: Quadrige/Presses Universitaires de France, 1998 (1968). English trans., Duration and Simultaneity, with Reference to Einstein's Theory, Jacobson, L. 1965. Indianapolis: Bobbs-Merrill; Clinamen Press Ltd., 2nd ed. 1999
113. Iqbal, M., 1934/2004. The Reconstruction of Religious Thought in Islam. (Edited and annotated by M. Saeed Sheikh 2004; First ed. 1934). N. Delhi: Adam Publishers & Distributores.
114. Hartle, J. and S.W. Hawking, 1983. The Wave Function of the Universe. Phys. Rev., D28: 2960-2975.
115. Hawking, S.W., 1988. A Brief History of Time: from Big Bang to Black Hole. New York: Bantam.
116. Hawking, S.W., 2004. Black Holes, enlightenment and Zen. The 17th International Conference on General Relativity and Gravitation, Dublin, Ireland. 17 July 2004. http://the- wanderling.com/hawking.html (Accessed 28 June, 2022)
117. Hawking, S.W. and G.F.R. Ellis, 1968. The cosmic black-body radiation and the existence of singularities in our universe. Astrophysical Jour, 152: 25-36.
118. Hawking, S.W. and R. Penrose, 1970. The singularities of gravitational collapse and cosmology. Proc. of the Royal Soc. of London, Series A, 315: 529-548.
119. Shaharir, B.M.Z., 1986. A new theoretical framework in formulating the Feynman path integral on Riemannian Manifold. Intern. Jour. of Theoretical Phys., 25: 1075-1093.
120. Shaharir, B.M.Z., 1996. An Improved version of the Feynman-Kac solution to a complex diffusion equation with a quadratic potential. In Proc. of the Math. Analysis and Stats. Conf. Part A: Theory and Methods, eds.,.Subanar, B. S. and Sri Wahyuni. Yogyakarta, Indonesia: Department of Maths. Faculty of Sc. and Maths. Gadjah Mada University, pp: 268-276.
121. Shaharir, B.M.Z. and bt. A.M. Hafsah, 1987. Beberapa ulasan baru tentang penyelesaian persamaan haba serta pencaman baru sukatan Feynman, sukatan Kac, sukatan Cameron dan sukatan Albevario dan Hoegh-Krohn. Jurnal Sains Malaysiana. Siri Pengajian Kuantitatif, 16(4): 377-388. (In Malay)
122. Shaharir, B.M.Z. and B.A.A. Zainal, 1995. On the exact real integral solution of the generalised linear diffusion equation. Singapore J. Physics, 11(1): 81-91.
123. Shaharir, B.M.Z. and B.A.A. Zainal, 1995. Real integral solution in term of classical path for a diffusion model with quadratic potential in one dimensional euclidean space. J. Fiz. Malayasia, 16: 43-58.
124. Shaharir, B.M.Z. and B.A.A. Zainal, 1996. On the nature of exact real integral solution for the generalised linear diffusion equation. Singapore Journal of Physics, 12(1): 1-7.
125. Shaharir, B.M.Z. and B.A.A. Zainal, 1996. Penyelesaian kamiran nyata berbentuk kamiran Feynman bagi persamaan resapan teritlak berpotensi ayunan harmonik. Jur. Sains Malaysiana, 25(1): 111-125 (In Malay)

126. Shaharir, B.M.Z. and B.A.A. Zainal, 1997. Penyelesaian kamiran nyata bagi persamaan resapan kompleks berpotensi kuadratik teritlak kompleks. Matematika, 13: 29-40 (In Malay)
127. Zainal, B.A.A. and B.M.Z. Shaharir, 1999. Exact real integral solution for the complex diffusion equation in n-dimensional Euclidean space. Jurnal Teknologi, 31(C): 21-38.
128. Shaharir, B.M.Z., 1990. Simbiosis antara Sistem Nilai dengan Matematik. Bangi, Selangor, Malaysia: Penerbit UKM. (In Malay).
129. Shaharir B.M.Z., 2002. Kaedah pengajaran dan Pendidikan pengoptimuman yang mendekati Nilai Islam. Pros.Simpos. Kebangsaan Sains Matematik Ke-9. Bangi, Selangor, Malaysia:Pusat Pengajian Sains Matematik, Universiti Kebangsan Malaysia, pp: 313-320. (In Malay).
130. Shaharir, B.M.Z., 2004. Perjuangan menegakkan system nilai Islam dalam pembinaan teori fizik. Majalah Fizik, Sains & Idea, 4: 18-27. (In Malay)
131. Shaharir, B.M.Z., 2007. Beberapa judul dalam fizik matematik: perspektif acuan sendiri. Kesturi, 17(1&2): 53-86. (In Malay)
132. Tisza, L., 1999. Unreasonable and reaonable in quantum mechanics. Foundation of Physics, 29(3): 491-495.
133. Tegmark, M. and J.A. Wheeler, 2001. 100 Years of Quantum Mysteries. Scientific American, February 2001.
134. Camilleri, K., 2007. Bohr, Heisenberg and the divergent views of complementarity. Studies in History and Philosophy of Science, 38(3): 514-528.
135. Moore, W.J., 1992. Schroedinger: Life and Thought. Cambridge, UK: Cambdrige Univ. Press.
136. Moore, W.J., 1994. A Life of Erwin Schroedinger. Cambridge, UK: Cambdrige Univ. Press.
137. Moore, W.J., 1996. Erwin Schroedinger: Una Vida. Cambridge, UK: Cambdrige Univ. Press.
138. Capra, F., 1978/2004. The Tao of Physics: an Exploration of the Parallels Between Modern Physics and Eastern Mysticism. 4th ed. 2004 (1st ed. 1978). Shambhala.
139. Ibrahim, B.S., 2002/2005. Sufism and quantum physics. The Fountain Magazine, 39, July-Sept 2002; The American Muslim, July 2005.
140. Shahidan, B.R., 2014. Points of onvergence between science and Sufism. Power point. 2nd WCIT Conference, 18-19 August 2014, Ipoh. http://www.academia.edu/7933574/Power_Point_Presentation_on_Points_of_Convergence_Between_Quantum_Mechanics_and_Sufism_ (Accessed 15 June 2022).
141. Polkinghorne, J., 2008. Quantum Physics & Theology: An Unexpected Kinship. Yale University Press.