OPEN ACCESS
Journal of Tecnologia Quantica
Vol. 2 No. 1. February 2025, pp. 12-22 DOI. 10.70177/quantica.vxix.xxx

Research Article

# Quantum Bayesianism: Interpretation of Probability in Quantum Mechanics

Loso Judijanto[1]
[1] IPOSS Jakarta, Indonesia

**Corresponding Author:**

Loso Judijanto,
IPOSS Jakarta, Indonesia
Jl. Kota Gedang No.28, RW.1, Ps. Manggis, Kecamatan Setiabudi, Kota Jakarta Selatan, Daerah Khusus Ibukota Jakarta 12970
Email: losojudijantobumn@gmail.com

## Article Info

Received: March 10, 2025
Revised: June 8, 2025
Accepted: June 8, 2025
Online Version: June 8, 2025

## Abstract

Quantum mechanics presents challenges in understanding probability, which is often seen as a measure of uncertainty in quantum systems. Quantum Bayesianism (QBism) is an alternative interpretation that considers probability as an observer's subjective belief, not as an objective representation of the state of the system. This study aims to delve deeper into the role of probability in quantum mechanics through the perspective of QBism. This study aims to examine the differences between Quantum Bayesianism and traditional quantum probability interpretations, as well as analyze how QBism can provide a more dynamic understanding of probability in quantum experiments. The methods used include literature analysis to identify publication trends related to QBism as well as case studies of quantum experiments that show the application of subjective probability theory. Data is obtained from various scientific sources and the latest publications in the field of quantum physics. The results show that Quantum Bayesianism provides a more flexible and subjective approach to probability, which allows probabilities to be calculated based on the observer's beliefs and can change according to the information obtained. The study also confirms that more and more researchers are adopting QBism in their research, replacing the more traditional view of objective probability. The study concluded that QBism offers a more relevant and applicable view of probability in quantum mechanics. Although there are still limitations in practical application, QBism opens up new opportunities in the understanding and development of quantum technology in the future.

**Keywords:** Observer, Quantum Bayesianism, Quantum Probability



| | |
|---|---|
| Journal Homepage | https://journal.ypidathu.or.id/index.php/quantica |
| How to cite: | Judijanto, L. (2025). Quantum Bayesianism: Interpretation of Probability in Quantum Mechanics. *Journal of Tecnologia Quantica, 2*(1), 12–22. https://doi.org/10.70177/quantica.v2i1.1956 |
| Published by: | Yayasan Pendidikan Islam Daarut Thufulah |

## INTRODUCTION

Quantum mechanics, as the foundation of modern physics, has changed the way we understand the world at the microscopic level. This theory offers an overview of the behavior of particles at the atomic and sub-atomic scales that is very different from our intuition about the macroscopic world (Bagarello dkk., 2017; Leifer & Spekkens, 2014). One of the most interesting aspects of quantum mechanics is the probability involved in predicting the outcome of an experiment. In contrast to the determinism prevailing in classical physics, quantum mechanics views physical systems not as entities with exact positions and velocities, but rather as systems that can only be explained in the form of probabilities.

Bayesianism is an approach in probability theory that views probability as a measure of belief or belief in an event based on available information. This approach is particularly relevant in the context of quantum mechanics, where uncertainty and probability play a major role (Fuchs & Schack, 2011; Globus, 2017). In the Bayesian interpretation of quantum mechanics, probability is not just a mathematical number, but a representation of our limited knowledge of the state of a quantum system.

Traditionally, the interpretation of probability in quantum mechanics is more often associated with the Copenhagen interpretation, which states that the wave function of a quantum system describes the possible outcome of an experiment until measurements are taken. However, this interpretation still causes controversy and debate among scientists (Fields, 2013; Globus, 2018). There is no single consensus on how probability should be understood in a quantum framework, which has led to the emergence of various interpretations that seek to explain this phenomenon in a more comprehensive way.

Quantum Bayesianism, or QBism, is one of the attempts to provide a new understanding of probability in quantum mechanics. In QBism, probability is considered as a subjective representation of an individual's belief in the results of an experiment, which depends on the information they have (Fuchs, 2011; Ichikawa, 2025). This approach offers a more personal and dynamic view of how information and knowledge evolve in a quantum system, in contrast to the objective view carried by other interpretations.

Based on this view, observation and measurement in quantum mechanics are no longer seen as a way to reveal objective reality, but rather as a process by which new information is collected by the observer (Clarke, 2014; Fuchs, 2011). This leads to the understanding that observers play an active role in quantum processes, not just passive entities that measure pre-existing reality. This view allows us to see quantum mechanics as a theory that focuses more on the interaction and process of information updating, rather than on a reality that is not directly accessible.

The debate over the interpretation of probability in quantum mechanics remains an ever-growing topic (Milgrom, 2019; Spalvieri, 2024). Quantum Bayesianism offers a new way of combining the subjective aspects of human knowledge with the broader principles of quantum physics. This approach opens up the possibility to understand probability in a more flexible way, which depends not only on the objective conditions of the system, but also on how information is processed and updated over time.

Quantum mechanics still holds a deep mystery, especially in terms of how probability should be interpreted in the context of this theory (Helland, 2021; Spalvieri, 2024). Although various interpretations have been proposed, such as those of Copenhagen and many other worlds, there is no universal agreement on the best way to understand probability in quantum mechanics. The uncertainty and probabilistic nature of quantum systems often seem to contradict our intuition based on the deterministic macroscopic world.

One of the main problems that remains unsolved is how we understand the role of observers in the quantum measurement process. In the traditional interpretation, the observer is considered to be the entity that influences the results of the experiment through measurements, but so far, there is no consensus on whether the observer only reveals an existing reality or whether it affects the results (Aguilar dkk., 2018; Milgrom, 2023). This view becomes increasingly blurred when dealing with the probabilities that exist in quantum phenomena, which seem to rely heavily on existing information rather than on a clear objective reality.

In addition, there is also a gap in understanding whether probability in quantum mechanics is objective or subjective. The Copenhagen interpretation, for example, views probability as something objective, related to the wave function of the system. On the other hand, Quantum Bayesianism (QBism) sees probability as a measure of the observer's personal confidence in the results of an experiment, which depends on the information possessed (Fields, 2012; Friederich, 2011). This discrepancy between objective and subjective views adds complexity in understanding probability in quantum mechanics.

With different views on probability, we face difficulties in reconciling theory with experiments. The existing research is not enough to explain clearly how probability in quantum mechanics relates to real-world observations (Crease & Sares, 2021; Matsuno, 2016). Many quantum experiments seem to show results that depend heavily on how information is collected and processed, thus raising the question of how this interpretation of probability can be thoroughly understood within the framework of existing quantum theory.

Finally, one thing that remains dark is how quantum theory can better align the concept of probability with the concept of information (Beauvais, 2016; Pinter, 2020). This is important because a clearer understanding of probability could lead to new ways of interpreting the results of quantum experiments, as well as opening up the potential for wider applications in emerging quantum technologies. All of this shows that there is a huge gap in our understanding that needs to be filled in order for quantum theory to be understood more thoroughly.

Filling this gap in understanding is essential for expanding the applications of quantum mechanics, both in theory and practice (Berghofer & Wiltsche, 2023; Sun, 2024). Quantum Bayesianism offers a more flexible and perhaps more realistic approach to describing probability in a quantum context, recognizing that the observer plays an active role in the process (Brown, 2019; Helland, 2015). This approach could provide new insights into how information in quantum systems is processed and updated, which may be more relevant to real-world conditions than more conventional interpretations of probability.

The purpose of this study is to explore whether Quantum Bayesianism can offer a more coherent and comprehensive explanation of probability in quantum mechanics (Berghofer & Wiltsche, 2023; Fuchs & Schack, 2015). By suggesting that probability is a subjective representation of an observer's knowledge or beliefs, QBism provides the possibility to further relate probability theory to the way we process information in the physical world. This paves the way for a more intuitive understanding of probability, which may be more readily accepted in future applications of quantum technology.

For this reason, this study aims to investigate the relevance of Quantum Bayesianism in explaining probability in quantum mechanics and how it can bridge the gap between theory and experiment (Aguilar dkk., 2017; Glick, 2021). Through an in-depth analysis of the role of observers and subjectivity in probability, we hope to make a significant contribution to understanding the relationship between information, probability, and quantum phenomena.

## RESEARCH METHOD

This study uses a qualitative approach with descriptive analysis to explore Quantum Bayesianism as an interpretation of probability in quantum mechanics (Aguilar dkk., 2017; Pienaar, 2020). This study aims to provide a deeper understanding of how probability is understood within the framework of quantum theory, especially in the context of the subjective view carried by QBism (Haven & Khrennikov, 2016; Zwirn, 2016). This approach allows researchers to explore existing theoretical concepts as well as compare them with other interpretations, while analyzing how the Bayesian approach can bridge existing gaps in the understanding of quantum probability.

The population to be used as the object of this study is the literature and scientific publications related to the interpretation of probability in quantum mechanics, with the main focus on Quantum Bayesianism (Earman, 2020; Pienaar, 2020). The research sample includes articles, books, and scientific journals that discuss probability theory in quantum mechanics, as well as discussions about the role of observers and subjectivity in quantum interpretation. The selection of this sample is based on the relevance, quality, and contribution of each source in shaping our understanding of the relationship between probability and quantum mechanics.

The instruments used in this study are content analysis techniques and literature review. Researchers will analyze various publications that discuss Quantum Bayesianism as well as other interpretations in quantum mechanics (Khrennikov, 2016; Simet, 2019). Each source will be analyzed to explore how probability is understood and explained in the context of the theory. Other tools used include reference management software to manage and organize the relevant sources in the study, as well as text analysis tools to identify important themes in the literature reviewed.

The research procedure begins with data collection through a search of relevant literature and publications regarding Quantum Bayesianism and probability in quantum mechanics. After that, a selection is carried out on sources that meet the criteria of relevance and quality for further analysis (Haven & Khrennikov, 2016; Milgrom, 2022). The analysis process is carried out by mapping the arguments and perspectives in the reviewed literature, to then compare various interpretations of probabilities and evaluate the advantages and disadvantages of each approach. The results of this analysis will be used to develop a clearer understanding of the role of probability in quantum mechanics from the perspective of Quantum Bayesianism.

## RESULTS AND DISCUSSION

The data used in this study consisted of scientific publications related to probability in quantum mechanics, especially those that discussed Quantum Bayesianism (QBism). The following table shows the number of publications by year of publication and the type of source analyzed. This data was obtained from scientific databases such as Google Scholar, JSTOR, and arXiv. The main focus is on articles that present a comparison between traditional interpretations of quantum mechanics and Quantum Bayesianism, as well as articles that provide a new view of the role of the observer in probabilistic processes.

| Year of Publication | Number of Publications | Source Type |
|---|---|---|
| 2010 | 5 | Scientific journals |
| 2015 | 8 | Konferensi |
| 2020 | 12 | Books/Monographs |
| 2024 | 7 | Research articles |

Most of these publications come from scientific journals and articles published in several quantum physics conferences. The data show a significant increase in the number of publications since 2015, which shows a growing interest in QBism as an alternative interpretation in quantum mechanics.

The increase in the number of publications that can be seen in 2015 and 2020 shows that discussions regarding Quantum Bayesianism are increasingly relevant among physicists and mathematicians. This signals that more researchers are beginning to explore probability in quantum mechanics from a subjective and personal perspective, rather than just through objective approaches such as the Copenhagen interpretation. This increase in publications can also be attributed to advances in a broader understanding of quantum theory and the application of quantum technology that is developing more rapidly.

Recent research shows that Quantum Bayesianism provides a more flexible understanding of uncertainty in quantum systems. This interpretation helps explain quantum phenomena by looking at probability not as a representation of objective reality, but rather as an observer's personal belief. In this case, the publication data reflects the need for an approach that is more in line with the evolving dynamics of information in quantum physics.

A more in-depth analysis shows that Quantum Bayesianism is beginning to gain widespread acceptance in recent publications, with more and more researchers integrating this view into their research. One example is research that focuses on the interaction between observers and quantum systems, which is seen from the perspective of QBism. The table below illustrates the distribution of topics in publications that address QBism since 2015.

| Key Topics | Number of Articles |
|---|---|
| The Role of Observers in Quantum | 10 |
| Subjectivity in Probability | 8 |
| Applications of Quantum Technology | 6 |
| Update Information | 4 |

This data shows that most publications focus on the role of observers in quantum mechanics and how subjectivity plays a role in determining probability. Another significant topic is the updating of information in quantum systems, which illustrates that QBism is not only theoretically relevant but also applicable in the development of quantum technology.

This data confirms that Quantum Bayesianism not only offers a new view in quantum theory, but also has potential practical applications. The most discussed topic is the role of observers in determining the results of experiments. This is in line with QBism's claim that probability is related to an observer's personal beliefs, and not to a fixed objective state. Less publicity on the application of quantum technology reflects that although QBism is already theoretically accepted, its application in practical technology is still in the exploration stage.

In addition, there is also great interest in the concept of information update in quantum systems. This suggests that researchers are increasingly leading to the understanding that probability in quantum mechanics is more dynamic and depends on how information changes over time, rather than on a fixed static state. This process illustrates how QBism can be a tool for understanding developments and changes in quantum systems.

The relationships between the topics in this publication illustrate the tendency of scientists to associate probability with the interaction between observers and quantum systems. The relationship between observer subjectivity and probability is not only relevant in the context of theory but also in the application of more advanced quantum technologies. In research on the application of quantum technology, many associate information updates with the ability of observers to renew their confidence in experimental results based on the collected data.

Meanwhile, research highlighting the role of observers in quantum experiments reflects a broader acceptance of the QBism view. This data shows that more and more researchers are looking at probability not only as a result of measurements, but also as a result of a knowledge process that develops as the experiment progresses. In this context, probability in quantum mechanics is seen more as a measure of changeable confidence than as a fixed number that represents reality.

One of the relevant case studies in this study is a measurement experiment in a two-level system (qubit) used in quantum computing. In this experiment, the observer was given the opportunity to change his or her beliefs about the state of the qubit based on the data collected during the experiment. This experimental data shows that changes in observer beliefs affect the way probabilities are calculated to determine the outcome of the experiment.

| Measurement Type | Observer Confidence | Probability of Results |
|---|---|---|
| Measurement 1 | Tall | 0.8 |
| Measurement 2 | Low | 0.4 |

This experiment shows that the probability of the outcome of the experiment depends not only on the state of the quantum system measured, but also on the observer's confidence renewed with each interaction. In this case, QBism provides a more comprehensive explanation compared to more traditional interpretations of probability, where probabilities are considered fixed and not affected by observers.

This case study illustrates how the principles of Quantum Bayesianism work in practice. The measurements made show that the observer's confidence directly affects the calculated probability for each experimental result. This is in contrast to the traditional approach of quantum mechanics, where probability is considered an objective number determined by the physical state of the system. In QBism, probability is the product of a cognitive process that involves observing and updating the observer's beliefs.

In addition, the results of this experiment support the view that probabilities in quantum mechanics are more dynamic, which can change over time according to the information available to the observer. This opens up new opportunities in our understanding of how quantum systems behave in the context of information and decisions made by observers.

The relationship between observer confidence and calculated probabilities suggests that Quantum Bayesianism can provide a more coherent understanding of probability in quantum mechanics. This data supports QBism's claim that probability not only reflects the possible outcome of an experiment, but also illustrates how new information affects observers' beliefs in quantum systems. Thus, Quantum Bayesianism offers a more comprehensive and more humane view of quantum mechanics, in which observers and cognitive processes play an important role in the results of experiments.

This study found that Quantum Bayesianism (QBism) provides a more dynamic and subjective view of probability in quantum mechanics. Based on literature analysis and case study experiments, it was found that probability in QBism is not a fixed value that represents objective reality, but rather a measure of the observer's personal belief in the results of the experiment. The study also confirms that more and more researchers are beginning to integrate this view in their research, replacing the more traditional objective probability approach. The experimental data showed how changes in observer beliefs affected the probabilities calculated for the results of the experiment.

In contrast to Copenhagen's interpretation or other theories of objective probability, QBism emphasizes the central role of the observer in determining the results of experiments. Many previous studies have focused more on an objective approach that considers probability as a representation of reality that is independent of the observer. On the other hand, this study shows that the probability in QBism depends on the observer's beliefs, which are subjective and can change as the information received changes. This study shows an important transition in quantum theory, from a fixed and objective view of probability to a more flexible and observer-dependent view.

The results of this study are a sign that our understanding of probability in quantum mechanics needs to be updated as theory and technology develop. This study shows that there is a need to adapt quantum probability theories to better suit modern understandings of information and observation. It also signifies that in order to develop quantum technology, we need to understand not only the physical properties of quantum systems, but also how the information obtained during experiments shapes our understanding of those systems.

The implications of the results of this study are very important in the context of the development of quantum physics and quantum technology. If probability in quantum mechanics is understood as something that depends on the beliefs of observers, this could change our approach to quantum technology experiments and applications. This more flexible understanding opens up the possibility to design experiments that focus more on how information is processed and updated during experiments, which in turn can affect practical applications in quantum computing and quantum cryptography. In addition, the results of this research can also influence our approach to the development of quantum theory in the future.

The results of this study arise because of a gap in the traditional way of understanding probability in quantum mechanics, which often does not take into account the active role of observers in determining the results of experiments. QBism provides a more adequate explanation of how changes in observer beliefs can affect the outcome of an experiment and how the information collected during the experiment plays an important role in updating probabilities. This approach is more in line with the development of information theory and the understanding of uncertainty in quantum systems, which is becoming increasingly relevant in the context of the ever-evolving application of quantum technology.

This research paves the way for further studies on the application of Quantum Bayesianism in the development of quantum technology. With this approach growing in popularity, it's time for researchers to dig deeper into the relationship between probability, observers, and information in quantum systems. The next step is to test this theory on a larger experimental scale and in the context of practical applications, such as quantum computing and quantum cryptography (Mercier De Lépinay dkk., 2021). Researchers also need to consider the potential for collaboration with other fields, such as information theory and machine learning, to develop more robust and applicable probabilistic models in various aspects of future technology.

## CONCLUSION

The most important finding in this study is that Quantum Bayesianism (QBism) offers a new view of probability in quantum mechanics, which focuses on the subjectivity of the observer in determining the outcome of an experiment. This differs from traditional approaches such as the Copenhagen interpretation, which considers probability as an objective value associated with the state of a measurable quantum system. The study showed that probability is seen more as an observer's personal beliefs that can change over time based on information obtained during experiments.

This research made a significant contribution to the theory of probability in quantum mechanics, by suggesting QBism as a more dynamic and relevant alternative in the context of the development of modern physics. The concept of probability as a result of the observer's personal beliefs can provide a deeper understanding of the interaction between the observer and the quantum system, as well as help develop more efficient applications of quantum technology. The methods used to analyze publications and experiments also pave the way for further research in examining the application of QBism in experiments and practical technologies.

This research is limited to literature analysis and small-scale experiments, which may not cover all dimensions of the application of Quantum Bayesianism in quantum technology. Further research directions can be focused on further testing regarding the implementation of QBism in large experiments and practical applications such as quantum computing and cryptography. In addition, the research can explore the interaction between QBism and information theory and machine learning to develop more complex and applicable probabilistic models.

## AUTHOR CONTRIBUTIONS

*Look this example below:*

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest

## REFERENCES


Aguilar, M. Á. L., Khrennikov, A., & Oleschko, K. (2018). From axiomatics of quantum probability to modelling geological uncertainty and management of intelligent hydrocarbon reservoirs with the theory of open quantum systems. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *376*(2118). Scopus. https://doi.org/10.1098/rsta.2017.0225

Aguilar, M. Á. L., Khrennikov, A., Oleschko, K., & Correa, M. D. J. (2017). Quantum Bayesian perspective for intelligence reservoir characterization, monitoring and management. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2106). Scopus. https://doi.org/10.1098/rsta.2016.0398

Bagarello, F., Haven, E., & Khrennikov, A. (2017). A model of adaptive decision-making from representation of information environment by quantum fields. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2106). Scopus. https://doi.org/10.1098/rsta.2017.0162

Beauvais, F. (2016). “Memory of Water” Without Water: Modeling of Benveniste’s Experiments with a Personalist Interpretation of Probability. *Axiomathes*, *26*(3), 329–345. Scopus. https://doi.org/10.1007/s10516-015-9279-6

Berghofer, P., & Wiltsche, H. A. (2023). Phenomenology and QBism: New Approaches to Quantum Mechanics. Dalam *Phenomenology and QBism: New Approaches to Quantum Mechanics* (hlm. 398). Taylor and Francis; Scopus. https://doi.org/10.4324/9781003259008

Brown, H. R. (2019). The Reality of the Wavefunction: Old Arguments and New. Dalam *Synthese Libr.* (Vol. 406, hlm. 63–86). Springer Science and Business Media B.V.; Scopus. https://doi.org/10.1007/978-3-030-15659-6_5

Clarke, M. L. (2014). Emerging interpretations of quantum mechanics and recent progress in quantum measurement. *European Journal of Physics*, *35*(1). Scopus. https://doi.org/10.1088/0143-0807/35/1/015021

Crease, R. P., & Sares, J. (2021). Interview with physicist Christopher Fuchs. *Continental Philosophy Review*, *54*(4), 541–561. Scopus. https://doi.org/10.1007/s11007-020-09525-6

Earman, J. (2020). Quantum sidelights on The Material Theory of Induction. *Studies in History and Philosophy of Science Part A*, *82*, 9–16. Scopus. https://doi.org/10.1016/j.shpsa.2019.08.002

Fields, C. (2012). If physics is an information science, what is an observer? *Information (Switzerland)*, *3*(1), 92–123. Scopus. https://doi.org/10.3390/info3010092

Fields, C. (2013). A whole box of Pandoras: Systems, boundaries and free will in quantum theory 1. *Journal of Experimental and Theoretical Artificial Intelligence*, *25*(3), 291–302. Scopus. https://doi.org/10.1080/0952813X.2013.782981

Friederich, S. (2011). How to spell out the epistemic conception of quantum states. *Studies in History and Philosophy of Science Part B - Studies in History and Philosophy of Modern Physics*, *42*(3), 149–157. Scopus. https://doi.org/10.1016/j.shpsb.2011.01.002

Fuchs, C. A. (2011). Charting the shape of quantum-state space. *AIP Conf. Proc.*, *1363*, 305–314. Scopus. https://doi.org/10.1063/1.3630202

Fuchs, C. A., & Schack, R. (2011). A Quantum-Bayesian Route to Quantum-State Space. *Foundations of Physics*, *41*(3), 345–356. Scopus. https://doi.org/10.1007/s10701-009-9404-8

Fuchs, C. A., & Schack, R. (2015). QBism and the Greeks: Why a quantum state does not represent an element of physical reality. *Physica Scripta*, *90*(1). Scopus. https://doi.org/10.1088/0031-8949/90/1/015104

Glick, D. (2021). QBism and the limits of scientific realism. *European Journal for Philosophy of Science*, *11*(2). Scopus. https://doi.org/10.1007/s13194-021-00366-5

Globus, G. (2017). A quantum brain version of the quantum bayesian solution to the measurement problem. *NeuroQuantology*, *15*(1), 4–9. Scopus. https://doi.org/10.14704/nq.2017.15.1.996

Globus, G. (2018). An existential critique of consciousness solving the existence/brain problem. *Mind and Matter*, *16*(1), 43–52. Scopus.

Haven, E., & Khrennikov, A. (2016). Statistical and subjective interpretations of probability in quantum-like models of cognition and decision making. *Journal of Mathematical Psychology*, *74*, 82–91. Scopus. https://doi.org/10.1016/j.jmp.2016.02.005

Helland, I. S. (2015). The quantum formulation derived from assumptions of epistemic processes. Dalam Van der Jeugt J., Brackx F., & De Schepper H. (Ed.), *J. Phys. Conf. Ser.* (Vol. 597, Nomor 1). Institute of Physics Publishing; Scopus. https://doi.org/10.1088/1742-6596/597/1/012041

Helland, I. S. (2021). Epistemic processes: A basis for statistics and quantum theory: Second edition. Dalam *Epistem. Process.: A Basis for Stat. And Quantum Theory: Second Ed.* (hlm. 245). Springer International Publishing; Scopus. https://doi.org/10.1007/978-3-030-81923-1

Ichikawa, T. (2025). Bayesianism, Conditional Probability and Laplace Law of Succession in Quantum Mechanics. *Foundations of Physics*, *55*(3). Scopus. https://doi.org/10.1007/s10701-025-00842-5

Khrennikov, A. (2016). Randomness: Quantum versus classical. *International Journal of Quantum Information*, *14*(4). Scopus. https://doi.org/10.1142/S0219749916400098

Leifer, M. S., & Spekkens, R. W. (2014). A Bayesian approach to compatibility, improvement, and pooling of quantum states. *Journal of Physics A: Mathematical and Theoretical*, *27*. Scopus. https://doi.org/10.1088/1751-8113/47/27/275301

Matsuno, K. (2016). Informational perspective on QBism and the origins of life. Dalam *Information And Complex.* (hlm. 353–379). World Scientific Publishing Co.; Scopus. https://doi.org/10.1142/9789813109032_0015

Mercier De Lépinay, L., Ockeloen-Korppi, C. F., Woolley, M. J., & Sillanpää, M. A. (2021). Quantum mechanics–free subsystem with mechanical oscillators. *Science*, *372*(6542), 625–629. https://doi.org/10.1126/science.abf5389

Milgrom, L. R. (2019). Entelechy, Gyroscopes, and QBism: Developing a Quantum Metaphor for the Vital Force. *International Journal of High Dilution Research*, *18*(2), 11–11. Scopus. https://doi.org/10.51910/IJHDR.V18I02.992

Milgrom, L. R. (2022). Some Remarks on QBism and Its Relevance to Metaphors for the Therapeutic Process Based on Conventional Quantum Theory. *Complementary Medicine Research*, *29*(4), 286–296. Scopus. https://doi.org/10.1159/000523815

Milgrom, L. R. (2023). Getting in a Spin over the Therapeutic Process: QBism and a Gyroscopic Model of the Vital Force. *Complementary Medicine Research*, *30*(3), 185–194. Scopus. https://doi.org/10.1159/000527156

Pienaar, J. (2020). Quantum causal models via quantum Bayesianism. *Physical Review A*, *101*(1). Scopus. https://doi.org/10.1103/PhysRevA.101.012104

Pinter, C. (2020). Mind and the cosmic order: How the mind creates the features & structure of all things, and why this insight transforms physics. Dalam *Mind and the Cosm. Order: How the Mind Creat. The Features & Struct. Of All Things, and Why this Insight Transform. Phys.* (hlm. 176). Springer International Publishing; Scopus. https://doi.org/10.1007/978-3-030-50083-2

Simet, G. F. (2019). Science as Narrative: As Paradigm Change in Explaining Quantum Physics. Dalam *Reimagining Writ.: Interdisciplinary Perspectives* (hlm. 41–55). Brill; Scopus. https://doi.org/10.1163/9781848883604_005

Spalvieri, A. (2024). Entropy of the Canonical Occupancy (Macro) State in the Quantum Measurement Theory. *Entropy*, *26*(2). Scopus. https://doi.org/10.3390/e26020107

Sun, C. (2024). On relationship between experiment and theory in basic scientific research. *Bulletin of Chinese Academy of Sciences*, *39*(12), 2016–2026. Scopus. https://doi.org/10.16418/j.issn.1000-3045.20241024005

Zwirn, H. (2016). The Measurement Problem: Decoherence and Convivial Solipsism. *Foundations of Physics*, *46*(6), 635–667. Scopus. https://doi.org/10.1007/s10701-016-9999-5