

Quantum Mechanics and reality

Georgina Woodward 20/2/2020

Giving up spacetime (continuum) local realism, for source uni-temporal noumenal reality allowing emergent phenomenal reality (that can be detected or sensed)

Abstract

The reality of the counterfactual, predictions, superposition, including wave-particle duality, wavefunction collapse and wavefunction are considered in the context of a uni-temporal, (Source) existence; noumenal (absolute) object reality, independent of observation. Observation products and measurements are considered to be relative and generated via the process of establishing a measurement relation and carrying out the measurement protocol.

Contrary to the ERP paper, it is argued that 100% certain predictions are not elements of reality.

Contrary to Einstein's instinct, it is argued that counterfactual measurements are not elements of reality awaiting discovery but require configuration of the universe from which they can be generated.

The need for super-luminal communication of particles is dismissed.

An alternative to wave-particle duality is proposed; explaining observations from double slit and half silvered mirror experiments .

The measurement problem is addressed.

'Consciousness causes collapse' has been refuted.

'Many Worlds' alternative to collapse is dismissed.

Quantum Mechanics and reality

Giving up spacetime (continuum) local realism, for source uni-temporal noumenal reality allowing emergent phenomenal reality (that can be detected or sensed)

This argument based on the premise of uni-temporal (Source) existence; noumenal (absolute) object reality, independent of observation. The configuration of which is ever evolving. And emergent from observation, and measurement, spacetime observation product representation, and relativity, via amalgamation of received inputs. 1. (Woodward, G., 12. 12. 2021) <https://vixra.org/abs/2112.0057> Proposed here because of its explanatory power in addressing multiple longstanding problems of physics, as has been demonstration the referenced paper.

“In the May 15, 1935 issue of *Physical Review* Albert Einstein co-authored a paper with his two postdoctoral research associates at the Institute for Advanced Study, Boris Podolsky and Nathan Rosen. The article was entitled “Can Quantum Mechanical Description of Physical Reality Be Considered Complete?” (Einstein *et al.* 1935).

Generally referred to as “EPR” ” 2. From: Fine, Arthur, "The Einstein-Podolsky-Rosen Argument in Quantum Theory", *The Stanford Encyclopedia of Philosophy* (Summer 2020 Edition), Edward N. Zalta (ed.), URL = <<https://plato.stanford.edu/archives/sum2020/entries/qt-epr/>>.

The ERP paper argues- “IF an observable property of a system could be predicted with

absolute certainty (100%) without disturbing that system, THEN it must correspond with an element of reality.” 3. *Bell's Theorem with Easy Math* By David R. Schneider www.DrChinese.com

This statement does not define what is meant by ‘reality’. It presumably tacitly assumes reality of the spacetime continuum idea.

The idea of an entangled particle pair is introduced in that paper. The thought experiment has a pair of particles, that (are imagined to) have interacted for a short time, separated, flying apart in opposite directions. Measurement of the individual partner particles is imagined. No presumption is made of random disruption of the status quo of particles and the local environment they each move through, in a vacuum. Nor ought there be; Ice. similar environments provide similar influence.

Measurement of one partner instantly gives knowledge of the same state of the other partner tested in the same way. Thus position of both can be found by testing one. Likewise testing momentum of one tells the momentum that would be measured for the other. Leading to the erroneous presumption that the measurement value (products) are in themselves elements of underlying reality just awaiting discovery.

“EPR also said that since it is "unreasonable" to believe that these particle attributes require observation to become real, therefore Hidden Variables must exist.” 3. *Bell's Theorem with Easy Math* By David R. Schneider www.DrChinese.com
Argument will be given to refute this.

Einstein said: "I think that a particle must have a separate reality independent of the measurements. That is: an electron has spin, location and so forth even when it is not being measured. I like to think that the moon is there even if I am not looking at it."

Observation product called Moon is not equivalent to independent of observation existing material moon object

Observation product called Moon is emergent from observation, not a source, material, noumenal reality.

Measurement is a kind of observation. Measurement results are observation product, phenomenal reality. The quantified measurements are not existential elements of noumenal, Object reality. Coming into being of an observation or measurement is not the same as coming into being of an existential element of noumenal reality.

“The Heisenberg Uncertainty Principle (HUP), a key component of Quantum Mechanics, says that these variables are not just unobservable; they simply don't exist outside of the context of an observation. This deviates from our everyday view of reality.” 3. *Bell's Theorem with Easy Math* By David R. Schneider www.DrChinese.com

Note, the valued variables are relative to measuring device, quantified products that are distinct from the unmeasured, un-quantified, absolute situs and motus of the existent noumenal particle.

The measurement of momentum is relative as it has a velocity component, that is necessarily relative. Establishing the measurement relationship is necessary prior to emergence of a definite value result. That relation does not preexist the establishment of the relation, in uni-temporal material reality. And following from establishment of relations, measurement, a kind of observation, is enabled.

Demise of the supposed reality of the counterfactual

Position/location of a *moving* object is an ideal instantaneous measure. **Arguing against Einstein: An instantaneous stationary location is incompatible with simultaneous possession of momentum.**

Momentum is a measurement that involves a sequence of time, a sequence of changing configuration of existence. If moving, the existing thing does not have a stationary position/location.

If it has stationary position the existing thing does not have momentum.

This indicates the unreality of counterfactual measurement results. (Might have beens.)

Firstly, considering phenomenal reality, the not measured/observed does not qualify as an observation product reality. Secondly, undertaking one kind of measurement prevents taking another different kind as well.

Remember this is taking about uni-temporal (no time dimension) existence. All noumenal existence is an ever changing configuration at the same time, -Now. Existential things do not exist in the past and future. Existential, noumenal, Object reality has no time dimension.

Noumenal source reality can not be simultaneous existence of both configurations of existing reality, that is able to produce both results. *There is just one configuration of all existence at any time. Noumenal reality has no existing past and future.* Unlike the spacetime continuum, in which both an instantaneous position, and future and past positions are equally real.

Like in the double slit experiment; a choice must be made. Detect individual particles at the slits, or have a screen. Choosing one noumenal reality prevents the other possibility. And with that exclusion, exclusion of the possibility of obtaining its corresponding observation product/ measurement result.

Bohm's variant of the ERP thought experiment

Instead of considering position and momentum, this considers the spins of an entangled electron positron pair. Measured along the same axis the spin of the particles is anti-correlated. Measured at different angles there is no correlation. It is said there seems to be super-luminal communication between particles allowing the certain rather than random result.

BUT for any pair, which particle is spin up and which is spin down is not known. Measuring a series of Particles As will give an apparently random outcome; As unpredictable. likewise measuring a series of particle Bs. The measurement of a singular B at an un-matching detector angle gives an outcome no less or more apparently random than any of the Bs of the earlier series. Each outcome determined by the relation of the particle as produced and the local conditions it encounters.

The anti-correlation is only apparent when there are matched local conditions applied to the particle opposites. No super-luminal communication needed.

Anti-correlation analogy: Although identical in structure, (but not orientation), Imagine them produced as as 'top' (sesame seeds) A and 'bottom' (plain) B of a burger-bun in whole bun relation to each other and the apparatus. However oriented, in same angle apparatus, they remain in anti-correlated 'burger-bun' relation to each other. Testing the 'burger-bun' halves at different angles is like lifting the 'bun' apart. The relation of the halves to each other is lost. Each half will experience different influence..

Sequential Stern Gerlach experiments show spin up or down result. The propensity to show a certain spin is not maintained across tests at different detector angles (different environment) when particles are retested at the original angle. It is not a fixed property. This seems to indicate that spin up/ or down is an emergent product and not due to an enduring condition of a noumenal, existential particle. A propensity to show a certain spin out come is temporarily retained/recreated under same, repeat angle testing, (uninterrupted by other angle testing). Furthermore, spin correlation and anti correlation of entangled particle pairs seems to show the particles come with a temporarily maintained relationship (relative orientation). And while preserved can be regarded as behaving as if one system, rather than two independent particles. The relation maintained/ lost according to local conditions encountered (as indicated by the Stern Gerlach experiments first discussed- i.e. change of environment affecting spin outcome); there is no inter-particle (super-luminal) communication.

Prediction

Using a spacetime continuum as model of the universe: A 100% certain prediction (with no unforeseen circumstances that prevent generation of of a measurement result) does correspond to an element of reality. As the future is as real as the present. Using a uni-temporal 'evolving' model there is no real future. So the prediction, however certain is only maybe. There could be unforeseen circumstances that prevent the measurement being made.

Unforeseen circumstances can apply to both models of the universe. The difference: 1. Spacetime continuum -most likely a corresponding element of reality is part of the continuum. 2. Uni-temporal 'evolving' universe -no correspondence to an element of

reality until the necessary evolution has occurred. I.e. The predicted is manifest as present.

Rabbits; analogy

Finding the state or measurement of a variable is not like pulling a 'magic' existing rabbit from a hat. Such a rabbit must be in the hat prior to extraction. Its being present in the hat, but its presence being unknown to the audience is the crux of the magic rabbit illusion. Instead it's more like determining (or predicting) the rabbits behaviour upon extraction. Like position and momentum. Calm is not struggling. Struggling is not calm. The two determinations are mutually exclusive.

Experiments could be conducted using pairs of tame rabbits (Calm pairs) put into two hats and likewise pairs of untamed rabbits likely to struggle. (Struggling pairs). (Ignoring the nature of the freeze response. This is analogy, not about real rabbit behaviour.)

The calm /struggling dichotomy, temperament of the rabbits, has been used to represent different 'properties'. Temperament is a characteristic not by itself a material body. Behaviours (observables) that belong to each temperament are useful here. *The behavioral observables or states related related to each temperament characteristic/ 'property' are not permanently fixed but may change according to the influences encountered. (Nurture not nature alone).* (Sequential Stern Gerlach experiments show spin up or down result. The propensity to show a certain spin is not maintained across tests at different detector angles (different environment) when particles are retested at the original angle. It is not a fixed property.)

Calm temperament (C) rabbits: 'Frozen' vs limp and, Struggling temperament (S) rabbits: Trying to burrow away in place vs Trying to hop away. These are mutually exclusive pairs of observations that could be analogy for superposition of *observation/ measurement states*. I.e. 'Frozen'/ Limp and Burrowing/ Hopping. The descriptions of the rabbits behaviour are new observation products. They are not the same as a material existing rabbit.

In a uni-temporal existential reality there is no after extraction state prior to extraction happening. There is not a prior to extraction post extraction observation product in the universe. (Unlike in the space time continuum model.) That does not mean there is no existing, rabbit in Object reality. A prediction of what the result would be if measured is not an observation product. The prediction depends upon there being an existing rabbit of a like pair. The observation product depends on the extraction and behaviour determination.

The result not found-where does it go?

It is never produced, so can't go /be anywhere. Occam's razor casts doubt (a great deal) upon a 'Many worlds' multiverse explanation.

Taking a coin toss result as an example. For the observation product (H) to be generated (single sided, corresponding to just the Electromagnetic radiation reflected from the coins exposed material surface, when the coin toss protocol is carried out); the configuration of the existing elements of noumenal Object reality must be such that the material observer and exposed surface of the coin object (H) are in unimpeded alignment that allows Electromagnetic radiation (EMr) transfer.

An alignment with surface (T) requires a different configuration. I.e. it can only be at a different configuration of the universe; a different time, if at all. The possibility of a different outcome because of a second side is not enough for the counterfactual result to be considered real. (Requiring that not realized relation with the observer, that would result in manifestation of (T) observation product) *Prior* to evolution of the universe into a configuration that provides a singular sided observation product, *either* is a possibility due to the two sided material, noumenal template.

Different 'quantum spin outcomes: Each requires a different evolution of the universe.

Re. the measurement problem

What/ when is the physical happening that corresponds to wavefunction collapse?

Reply: Superposition of outcome states has neither noumenal nor phenomenal reality.

It follows from this, that the wavefunction containing superposition is not reality.

Eigenvalues too are not noumenal or phenomenal reality; representing not yet manifest or not measurement outcomes.

They are abstract representations of incompletely known potential considering isolated undisturbed systems (limited applicability to the outside world.) Not being part of existing noumenal reality, QM's supposed wave nature of of what can be known about the particle, and process of collapses or splitting yielding a singular state observation is not causal. Instead it can be proposed that causality is due to the 'possessed' unmeasured location 'situs' and unmeasured orientation 'orientum' and unmeasured absolute momentum 'motus', absolute energy 'Energia' of the existing, noumenal particle, and its relation to the configuration of uni-temporal noumenal existence that pertains. From which the observable outcome product is produced (not pre-existing/ awaiting, as it would be in the spacetime continuum). Location, spin, momentum and energy are the comparable terms for relative observation product phenomena.

Emergence

The evolution of the universe is not due to the collection of sub atomic wavefunctions but how the particles of the universe are configured and those configurations are changing. The outcomes of forces acting, As matter interacts or is acted upon by existential fields.

The particles of a flying plane, such as the electrons of the metal fuselage do not have their unmeasured position 'situs' in the universe due to the nature of the particles but due to the propulsion provided by the engine, possible because of its configuration, combustion of fuel (chemical change of configuration) and the emergent property of lift due to the wings form and its relation to the air.

Using the rabbit from a hat analogy- the superposition of states is not a material rabbit. As the state has not yet been observed or measured it is not an observation product. So not a phenomenal reality either. The calm /struggling temperamental dichotomy has been used to represent different mutually exclusive properties. That can not be manifest at the same time.

C rabbits temperament (property analogy): 'Frozen' vs limp observation. These are mutually exclusive pairs of observations that could be analogy for superposition of observation/ measurement states.

S rabbits temperament (property analogy): Trying to burrow away in place vs Trying to hop away. Mutually exclusive pairs of observations that could be analogy for superposition of observation/ measurement for this temperament.

Being neither noumenal nor phenomenal reality, (and mutually exclusive possibilities for the observed/ measured state, that can not be manifest at the same time), means a superposition can not be interacting with the existing environment, causing collapse to a singular state. It can be considered a place holder for unknown evolution of the configuration of the universe. A 'black box' happening.

Therefore,

perhaps a different question should be asked. **When should the template potential (existing, material, noumenal Object reality) be given up prior to manifestation of a singular observation/ measurement result (phenomenal product)?**

In a uni-temporal universe one state evolves as there is only one configuration of existing noumenal reality from which the observed/measured result (phenomenon) is produced. The 'picture' of a superposition of outcome states taking both branches of an apparatus, for example, should not be taken literally/exactly.

It is representing a situation where there is or was potential for a system to evolve in different ways, that would produce different outcomes. Yet it is not known when exactly the system has moved such that one particular outcome becomes inevitable. It remains as an abstract place holder (for a representation of what is actually happening- that we don't have) until the observation/measurement is produced. State production (preceding observation) is enough to know the former dual potential is lost. Arguing against 'consciousness causes collapse'. For there to be knowledge of which singular outcome has been produced the output result of the apparatus must be sensed (or converted to a form that can be sensed at a later time, using a recording device. This late stage is where consciousness enters the picture. Not in creation of the outcome, but being the awareness of it made possible via, most likely, vision or hearing. Which involves the

making of another observation product using sensory input received by the observer (from the apparatus or recording device).

The double slit experiment

Experiment purportedly demonstrating the wave-particle duality of quantum particles. Rather, this seems to be demonstrating the existing, noumenal presence of a kind of wave supporting substance, in vacuo, with which particles can interact. Acting on and being acted upon by it. Stemming from that relation comes emergence of the observable observation product phenomenon. A wave interference pattern shown by the distribution of particles arriving at the screen, showing their paths influenced by interfering waves. The other observed phenomenon is particles being detected en route through only one or the other slit, never both.

The results alone do not conclusively show this is particle-environment interaction, but there are hydrodynamic analogs (bouncing oil droplets on vibrating oil bath) showing many behaviours associated with quantum systems. The analogs never show behaviour that could be interpreted as an analog for superposition of states. Wave-particle duality is not seen- but instead discreet droplet—environment interaction. This supports the claim that superposition of states is an abstract, philosophical/ mathematical concept; not a noumenal nor phenomenal reality. The superposition/ wave particle duality only works if the droplet and environment are considered as the same thing. This has been favoured by quantum physicists because of the desire for non locality, to aid explanation of other results. However, see earlier discussion- Bohm's variant of the ERP thought experiment. Refuting the necessity of non locality, allowing apparently super-luminal communication.

Oil/oil=same, oil pool/oil droplet=different. My inclination is to say that although both are the same substance they are different forms of existence. Justifiably considered as different things.

A wave supporting existing, noumenal substance in the in vacuo environment can also account for wave interference seen in half silvered mirror experiments. An individual particle always takes one path. However, the waves in the environment can be split so they take both paths. Interfering when rejoined, affecting the particles trajectory. Leading to the observation product outcomes.

Conclusion

Within the explanatory framework considered, encompassing both noumenal uni-temporal existence and phenomenal emergent observation products:

Contrary to the ERP paper, it is argued that 100% certain predictions are not elements of reality

Contrary to Einstein's instinct, it is argued that counterfactual measurements are not elements of reality awaiting discovery but require configuration of the universe from which they can be generated

Predictions, counterfactual outcomes, superposition, wavefunction are /are about abstract ideas that can be imagined and represented but are not in themselves elements of reality.

Sequential Stern Gerlach experiments show spin up or down result propensity is not maintained across tests at different detector angles. It is not a fixed property.

Spin correlation and anti correlation of entangled particle pairs seems to show the particles come with a temporarily maintained relationship (relative orientation). And while preserved can be regarded as behaving as one system, rather than two independent particles. However the relation between them is maintained/ lost according to local conditions encountered; No unilateral perturbation. Not by inter-particle (super-luminal) communication.

Superposition, and by extension wavefunctions containing them are not elements of noumenal or phenomenal reality. Eigenvalues too are not noumenal or phenomenal reality; representing not yet manifest or not measurement outcomes. They are abstract representations of incompletely known potential.

An alternative to wave-particle duality is proposed; explaining observations from double slit and half silvered mirror experiments.

There is no actual wavefunction collapse but evolution of noumenal reality into a condition from which one outcome state and not the other previous possibility can be generated.

'Consciousness causes collapse' has been refuted.

The result not found-where does it go? It is never produced, so can't go /be anywhere. Occam's razor casts doubt (a great deal) upon a multiverse explanation.

References

1. (Woodward, G., 12.12. 2021) <https://vixra.org/abs/2112.0057>
2. Fine, Arthur, "The Einstein-Rosen-Podolsky Argument in Quantum Theory", *The Stanford Encyclopedia of Philosophy* (Summer 2020 Edition), Edward N. Zalta (ed.), URL = <<https://plato.stanford.edu/archives/sum2020/entries/qt-epr/>>.
3. Bell's Theorem with Easy Math By David R. Schneider www.DrChinese.com