Quantum Ontology: Some Dos and Don'ts

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Quantum physics = the fundamental theoretical framework of contemporary physics

Quantum Physics → Ontology ?

NO !

Science presupposes a metaphysical framework that supplies questions and interprets answers.

This metaphysical framework is not testable the way a scientific theory is testable.

No scientific theory, therefore, can in and of itself supply an ontology.

But: Quantum physics makes more sense when interpreted in the right metaphysical framework than when interpreted in the wrong framework .

Richard Feynman:
"Nobody understand quantum mechanics."

Roger Penrose:
"Quantum mechanics makes absolutely no sense."

Michio Kaku:
"Of all the theories proposed in the 20th century, quantum mechanics is the silliest."

They obviously lack the right framework.

Quantum mechanics is a computational tool:
it provides algorithms that allow us to calculate the probabilities of possible measurement outcomes on the basis of actual measurement outcomes.

From this irreducible core of the theory two different lines of inquiry proceed.

The first – the fruitful one – analyzes the only testable part of the theory: the predicted correlations between measurement outcomes.

The other – a red herring – makes untestable metaphysical assumptions that lead to pseudo-problems and gratuitous answers, and ultimately to the appraisals just quoted.

The most noxious untestable assumption is probably this:

(Physical) reality is completely differentiated with respect to both space and time.

This assumption is implicit in the following all but universally shared belief:

Physics neatly separates into

kinematics, concerned with the description of physical systems at an instant of time,

and

dynamics, concerned with how this description "evolves" (changes with time).

If we apply this “evolutionary paradigm”
to the computational tools of quantum mechanics
(wave functions, state vectors, and such)
as if they were
descriptions of physical systems at an instant of time,
we are faced with the mother of all quantum-mechanical
pseudo-problems:

Why two modes of evolution?

To have one is normal (according to said paradigm),
and what is normal needs no explanation.
But what accounts for the second – the so-called
“collapse of the wave function”
(a.k.a. “state vector reduction”) ?

Since the "collapse" happens at the time of an "observation," one of the gratuitous answers proposed was: the consciousness of the observer !

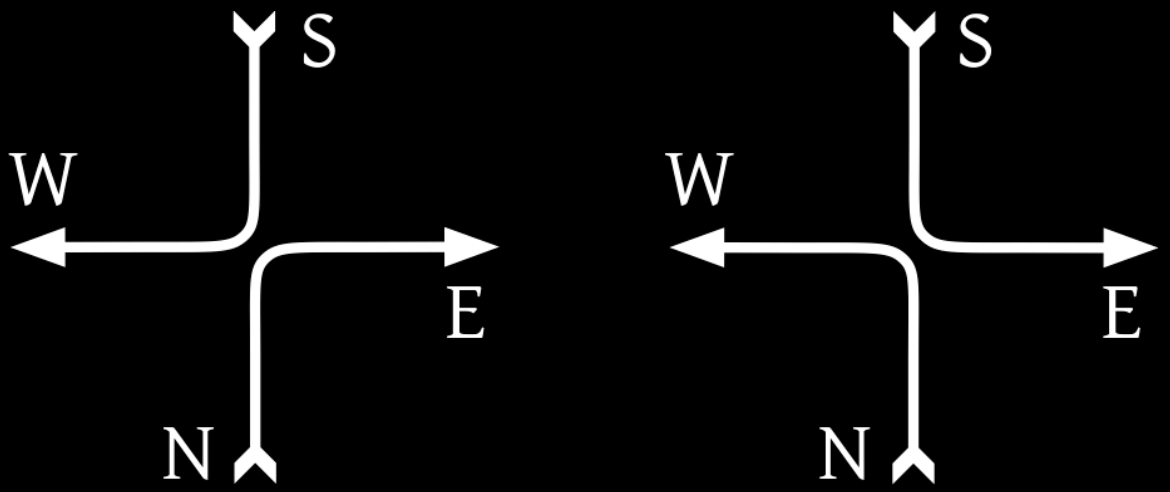
Let's return to the facts: The computational tools of quantum mechanics are not (nor do they represent) ontological states. You feed them

(i) the time and the possible outcomes of a measurement M that may be made,
(ii) the times and the actual outcomes of measurements that have been made.

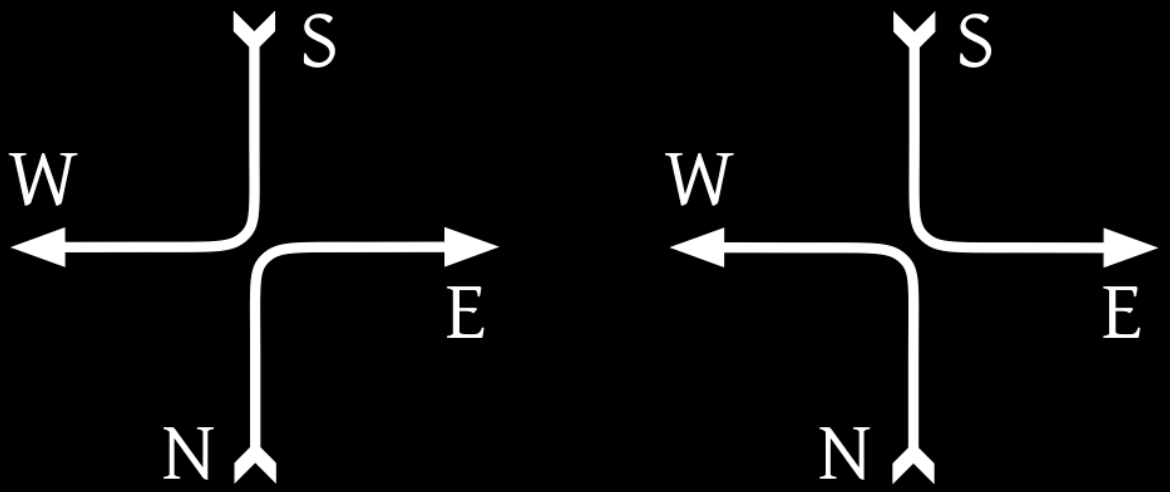
They then return
the probabilities of the possible outcomes of M.

No evolution → no collapse → no need for anything (let alone consciousness) to cause a collapse.

Having made the necessary ontological disinvestment,
we are ready to re-invest.

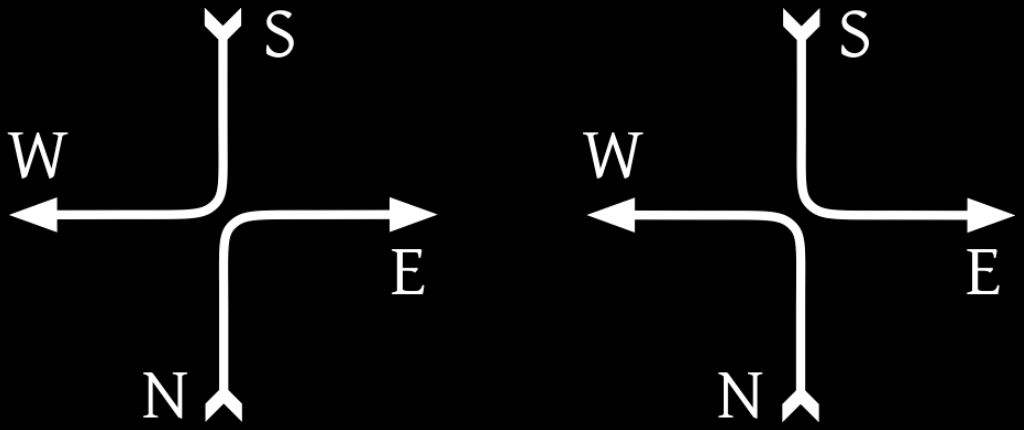


Which incoming particle is identical with
which outgoing particle?
The question is meaningless:
there is no answer !



Meaningless questions arise from false assumptions,
in this case the assumptions that...

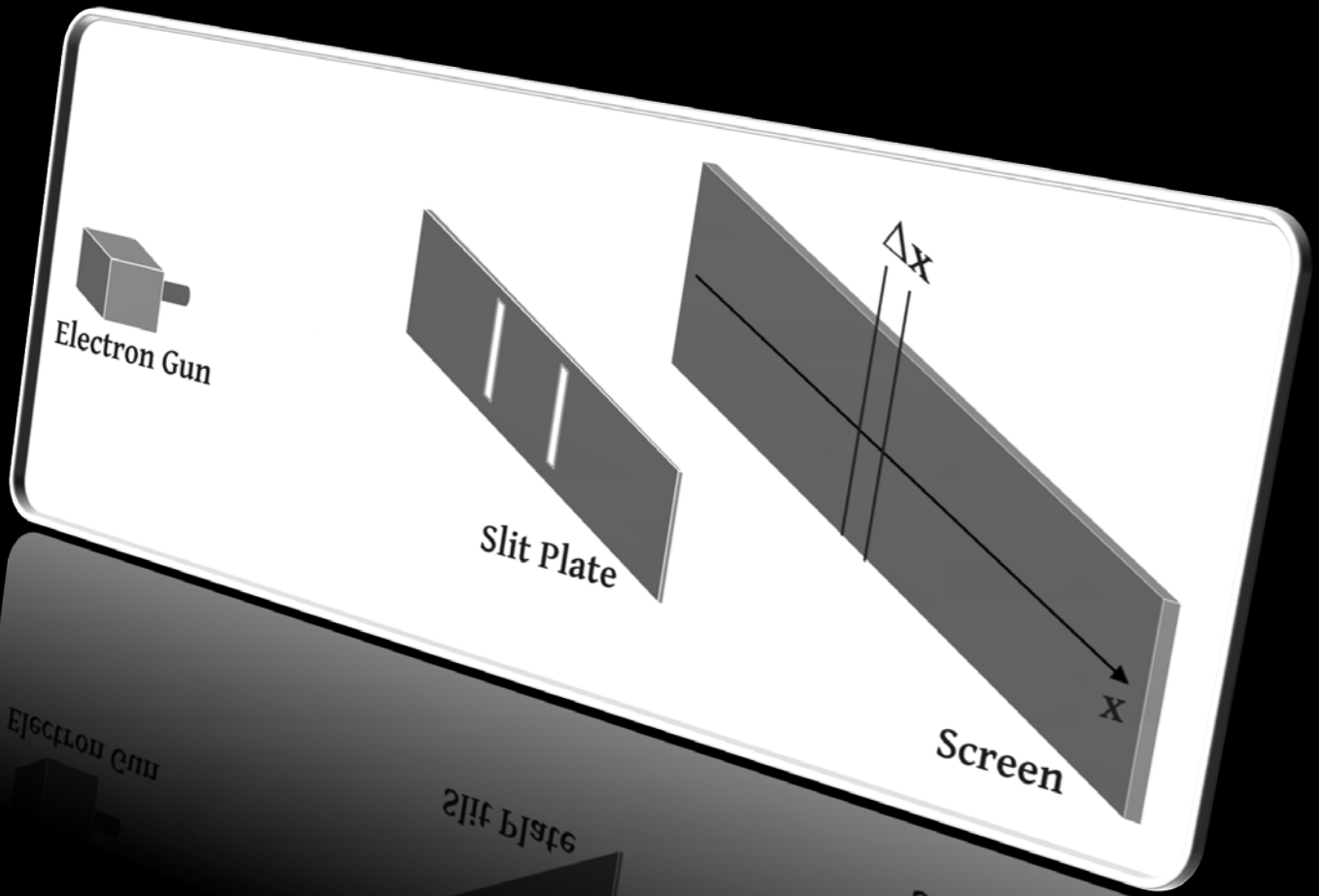
Initially there are two things, S and N.
In the end there are two things, E and W.
So which is which?



Instead: initially there is one thing moving both northward and southward, and in the end there is one thing moving both eastward and westward.
The meaningless question no longer arises !

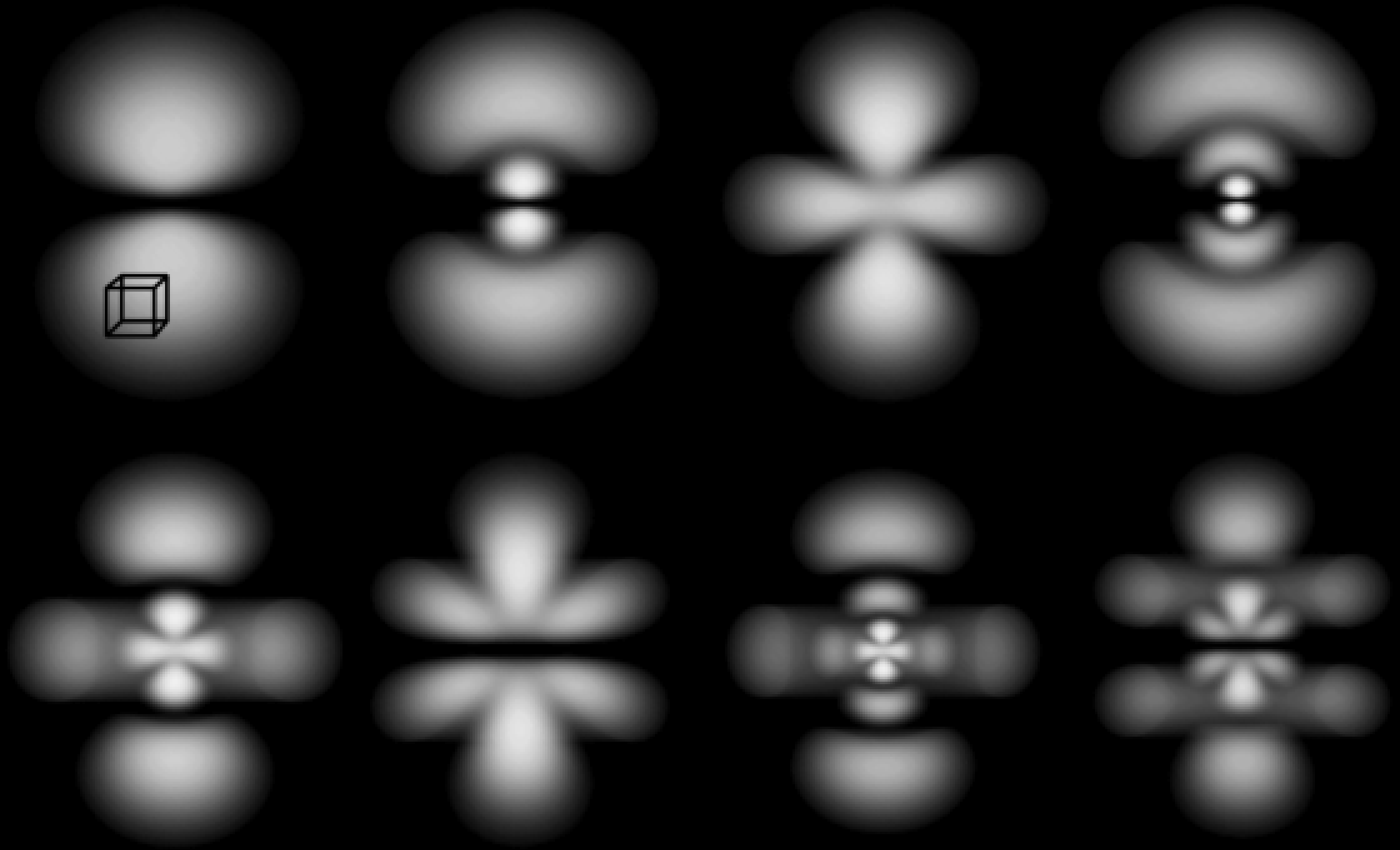
The conclusion bears generalization:
The properties of “fundamental particles” being relational,
a “fundamental particle,” considered in and of itself,
lacks properties.
The number of “ultimate constituents of matter”
therefore equals 1.

Which slit did the electron take?
The question is meaningless: there is no answer !



This bears on our conception of space.
Considered as an intrinsically partitioned, self-existent expanse, space cannot accommodate fuzzy positions.

But the stability of matter requires fuzzy positions !



Space therefore must be conceived as a set of fuzzy relations.

As a result,
(i) the shapes of things resolve themselves into fuzzy self-relations – relations between UR (Ultimate Reality) and UR, and
(ii) the ultimate constituent of matter (each "fundamental particle") is formless.

Thus if we keep dividing a material object, its "individual constituents" lose both their form and their individuality.

By the same token, if we conceptually partition the world into smaller and smaller regions, we reach a point at which the distinctions we make between regions no longer correspond to anything in the actual world.
The spatial differentiation of the physical world is incomplete: it doesn't go "all the way down."

Hence the physical world cannot be modelled from the bottom up, by assembling pre-existent building blocks or by assigning physical properties to the "points of space." Reality is built (structured) from the top down.

"The foundation is above." (Rig Veda I 24.7)

As far as physics is concerned, this is what distinguishes a materialistic world view from a spiritual one:

The former models reality from the bottom up, the latter from the top down.

Quality and value are strangers in a materialistically conceived world: what ultimately exists, is "dust."

(Taking my cue from the Upanishads:)
UR = Infinite Quality/Value/Bliss (*ānanda*) is at the heart of a spiritually conceived world.

“Reality is built from the top down.”
How?

By UR’s entering into spatial relations with itself !

As a result, there is space –
the totality of existing spatial relations,
and there is matter –
the apparent multitude of relata
(“apparent” because the relations are self-relations).

And how does UR enter into spatial relations with itself?

In a spiritually conceived world, this has to be
a psychological process.

UR (intrinsically transcategorial) relates to the world

- as the substance (*sat*) that constitutes it,
- as the consciousness (*chit*) that contains it,
- as the force (*tapas*) that shapes it, and
- as the infinite bliss/quality/value (*ānanda*)

that expresses and experiences itself in it.

Originally, the self is coextensive with the content of its consciousness.
In a secondary poise, it localizes itself manifoldly within this content.
In a tertiary poise, it makes this multiple concentration of consciousness exclusive.

There are various degrees of exclusiveness, which may be characterized by dividing the creative process into the following stages:

Infinite Quality
→ Expressive Idea
→ Executive Force
→ Revealing Form

First degree of exclusiveness: infinite quality involved in expressive idea – supermind reduced to mind.
Second degree of exclusiveness: expressive idea involved in executive force – mind reduced to life.
Third degree of exclusiveness: executive idea involved in revealing form – life reduced to matter.

The action of the supermind is primarily qualitative and infinite and only secondarily quantitative and finite.
Essentially, mind is this secondary, limiting and defining action.

The involution of the supermind brings with it a loss of unity.
The actions of mind, life, and matter are therefore centered in the individual.
Hence if the executive force of life gets involved in matter, the result is a multitude of formless individuals.

What else does it take to set the stage for the drama of evolution ?

All of the empirically well-tested laws of physics !

Every conceivable measurement outcome has a probability greater than zero unless it violates a conservation law.

Physics therefore never explains how "how nature does it." It only explains – via its conservation laws – why certain things won't happen.

This is exactly what one would expect if the force at work in the world were an infinite force operating under self-imposed constraints. We therefore have no reason to be surprised by the impossibility of explaining the quantum-mechanical correlations laws except in terms of final causes. (It would be self-contradictory to explain the working of an infinite force in terms of efficient causes.)

What needs explaining is only why this force works under the constraints that it does.

More specifically, the empirically well-tested physical laws can be derived by requiring the existence of material objects
(i) that are stable,
(ii) that "occupy" space, and
(iii) that are "made of" (finite numbers of) objects that do not "occupy" space.

Requiring the existence of objects that are stable and "occupy" space appears to be beyond dispute, but why are objects that "occupy" space "made of" objects that don't?

Because a multitude of formless particles is the final result of the process of involution, by which the stage was set for the drama of evolution.

There is more to the pivotal role that measurements play in the fundamental theoretical framework of physics.

Various "no-go theorems" – for instance Bell's theorem – have shown that the quantum-mechanical correlations are at odds with pre-existing properties.

In the quantum world, to be is to be measured.

The microworld is what it is because of what happens or is the case in the macroworld – not the other way round, as we are wont to think.

How can this be?

Quantum mechanics affords us a glimpse "behind" the manifested world at formless particles, non-visualizable atoms, and partly visualizable molecules.
Instead of being the world's constituent parts or structures, these are instrumental in its manifestation – the transition from undifferentiated unity to effective multiplicity.

But:

What lies "behind" the manifested world can only be described (in fact, defined) in terms of the finished product – the manifested world.

For example, for it to be possible to attribute to a particle the property of being in a region R, the region R needs to exist as the sensitive region of a macroscopic detector (in the broadest sense of the term).