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The Paths of Quantum Physics in the Modern Age

by Dr. Manfred Pohl

Abstract:

The successes of quantum physics in its 100 years since 1925 are characterized by a multitude of practical applications. They enrich daily life and serve as models in many areas of applied physics. In the theoretical realm of fundamental research in the fields of theoretical physics and cosmology, there is a considerable need for correction regarding conceptions of the nature of matter, its states, and its motions. At several Austrian universities, for example, research is being conducted to experimentally prove the religious concept of creation. In this work. I attempt to interpret erroneous conceptions and illuminate them from a dialectical-materialist perspective.

Main part:

After 100 years of quantum physics, a summary seems appropriate, summarizing some of the results this branch of science has achieved over these past 100 years. In everyday life, quantum physics has found its way into diverse areas where we often no longer even notice it. For example, quantum mechanics is present in everyday technical devices such as lasers, LEDs, diodes, transistors, microprocessors, quartz watches, computers, iPhones, and smartphones. Applications in medicine, such as computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), and electron microscopy in general, are also exemplary. There are numerous uses in energy supply and materials science. Quantum physical effects will continue to assert themselves in many areas in the future, too many to list here. Quantum physics and the technology built upon it have become an inseparable part of industrialization.

However, as in any other science, speculative and mystical representations also emerge on the fringes, in which the technology is explained incorrectly, even misleadingly, thus creating obstacles to further development. In the case of quantum mechanics, such misconceptions extend deep into theoretical physics and even affect scientists who deal with the subject professionally. The following article will specifically address such misconceptions and, where possible, investigate their causes.

If one searches the internet for explanations of quantum physics in various ways, one encounters many representations that are understood quite differently by scientists and researchers due to their differing worldviews. This is not always detrimental, however, because the discussion of differing opinions is generally conducive to scientific development; it can be a driving force of scientific progress. However, one must always explore the boundaries beyond which science descends into superstition, rendering discussion useless because fundamental principles of physics are rejected or denied. This leads to the development of pseudotheories that are detrimental to scientific progress, as they mislead entire fields of knowledge.

I searched the internet using specific questions about quantum physics and found much that is either outdated from a scientific perspective or incorrectly explained due to a lack of fundamental knowledge or outdated understanding. Scientific research institutions worldwide are working diligently on the development of quantum physics. I was aware, for example, that extensive research in the field of quantum physics is being conducted at Austrian universities. However, I was also aware that many of these

research projects pursue goals whose scientific validity is sometimes questionable. For example, if the stated goal of a research project is to create matter from nothing, I believe there are doubts about the meaningfulness of such work. Humanity's collective knowledge on this topic has advanced to such an extent that today, for example, doubts about the conservation laws of fundamental physical quantities are viewed with suspicion. The idea of creating matter from nothing, however, is incompatible with the conservation laws.

So I used Google's AI mode to get more detailed information. The answers I found essentially reflect the currently held official opinions. I quote these answers with a few brief comments in red.

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Google AI query: **Austrian researchers: Matter from nothing.**

Answers:

Austrian researchers made significant progress in 2025 in creating matter from "nothing" (light or vacuum):

1. Origin of Particles from Light Collisions (2025):
   Physicists at the **Vienna University of Technology** reported in August 2025 on the observation of "ghost particles" that arise from the interaction of light beams at the quantum level.
   This introduction already sounds very suspicious. It would be necessary to describe in more details what is meant by "ghost particles," because science generally has little to do with ghosts. It would also certainly be necessary to explain what a quantum level is.

   - Phenomenon: In this process, known as light-light scattering, virtual particles are briefly created from what appears to be nothing.
     Light is energy – and therefore, due to mass-energy equivalence, it is always accompanied by mass. The particles do not arise from nothing, but from the mass that is supplied with the energy of the light. These particles are not virtual, but real, because they have mass. Furthermore, the term "virtual particles" is difficult to grasp; it is unclear.
   - Significance: This refutes the classical notion that light waves pass through each other unaffected and shows that under extreme conditions, light interacts directly with itself and can give rise to matter-like states.
     "Matter-like" states? What could that be? Mass or non-mass? This would have to be explicitly stated. What are the extreme conditions under which light interacts with itself? As presented, the statement is rather vague.

2. Matter from the vacuum (University of Graz):
   Researchers at the University of Graz have already demonstrated in theoretical models and simulations that matter (in the form of electrons and positrons) can be created directly from the vacuum by extremely strong electric fields.
   Electric fields are energy fields. The particles therefore do not originate from the vacuum, but from the equivalent mass of the energy contained in the vacuum. This energy, too, does not exist without mass.

   - Principle: By passing intense fields through a vacuum, particle pairs are created spontaneously.

This is not surprising, since the energy fields contain equivalent mass. The achievement of the experiment lies in providing conclusive evidence for these particle pairs.

- Background: This utilizes the equivalence of energy and mass ($E = m \cdot c^2$), whereby the energy of the field is converted into physical particles.
  This is fundamentally wrong. The notion of a "conversion" of mass into energy and vice versa is still circulating. However, it has been clearly refuted that such a process is possible. Above all, the mass-energy equivalence equation cannot be used to explain this "conversion," because it does not, in fact, demonstrate this.

3. Further Quantum Breakthroughs in Austria (2025):
In 2025, Austria solidified its position as a leading nation in quantum physics (within the framework of the UN-proclaimed **International Year of Quantum Science**).
This is a great recognition for the country and its research institutions. Indeed, Austria has achieved considerable success in this scientific discipline in the recent past. One can only hope that this success is not based solely on the misconceptions described below:

- Time Reversal: Researchers in Innsbruck and Vienna demonstrated a “quantum switch” with which the state of a photon (light particle) can be reset in time.
  It is unclear what this means. Back to where? If the photons assume a different state, time does not run backward. The root cause of this attitude seems to be the interpretation of time as a material object, as something that can be manipulated.
- Photon splitting: In September 2025, it was possible for the first time to stably split a single photon, thereby proving the conservation of angular momentum at a fundamental level.
  Splitting a single photon would mean dividing its mass. This is a very sophisticated approach because it is still officially denied that photons have mass. According to the wave energy equations, this would indeed prove the conservation of angular momentum. Splitting would also mean a change in the radiation frequency and thus prove that mass must be a quantized quantity. However, this is not explained (1), (2).
- Quantum storage: At the University of Innsbruck, a method was developed to store light particles in a "dark state" in order to later reintegrate them in a controlled manner into matter interactions.
  This means stopping the quantum to store its rest mass. Demonstrating this would be an outstanding scientific achievement. It would also be a way to demonstrate the quantization of mass, which is still officially denied.

Google AI question: **Matter from nothing**

Answers:

In modern physics of the year 2026, the creation of matter "out of nothing" is primarily explained by the conversion of energy into mass. Strictly speaking, this is not an absolute nothingness, but rather the quantum vacuum, which constantly fluctuates with energy.
This explanation is inherently meaningless because there is no conversion of energy into mass. However, it confirms the understanding that there is no absolute vacuum. A vacuum always contains a quantity of matter (energy and mass) greater than zero. The repeated claim that a "conversion" of mass into energy and vice versa occurs is unreal.

This is not a physical process, but a superstition outside the realm of scientific explanation.

Here are the central concepts and experimental advances:

1. Vacuum Fluctuations
   The vacuum is not empty space, but is filled with quantum fluctuations. In fractions of a second, pairs of particles and antiparticles (virtual particles) are constantly created and almost immediately annihilate each other.
   Thus, the assertion that matter can be created and destroyed still dominates. This error cannot be rectified by simply calling the particles "virtual." When the resulting particle pairs annihilate, their mass cannot disappear; it is the equivalent mass of the energy present in the vacuum. And this mass, like the energy, is conserved in all transformation processes.
   - **Hawking radiation**: At the event horizons of black holes, these particle pairs can be separated, causing one of the particles to escape as real matter.
     Hawking radiation has been disproven. It was a theoretical approach by Stephen Hawking aimed at refuting the argument that nothing can escape from a black hole. In fact, black holes emit jets in the axial direction, demonstrating that they, like all other cosmic objects, can form and disappear. Hawking radiation would suggest that a black hole consists of antimatter.
2. The Schwinger Effect
   This effect describes how an extremely strong electric field can "rip" particle pairs (electrons and positrons) directly out of the vacuum.
   - **As of 2026**: Researchers have found ways to mimic this effect using special materials such as superfluid helium or ultrathin films to experimentally demonstrate the creation of particles from field energy.
     An energy field always contains an equivalent mass. The particles will consist of this mass if they can be detected. "Tearing" them out of the vacuum is nonsense.
3. Matter from Light (Breit-Wheeler Effect)
   According to Einstein's formula $E=mc^2$, energy can be converted into mass.
   We should finally abandon this nonsense (13), (14), (15).
   - **Experimental proof:** Physicists at Brookhaven National Laboratory were able to show that real matter in the form of electron-positron pairs is created when high-energy light particles (photons) collide. Light, which itself has no rest mass, is thus directly transformed into matter with mass.
     This is incorrect. The rest mass of photons is not zero. If it were zero, light could have no momentum. But momentum has been proven (1), (2). The creation of electron-positron pairs from nothing cannot be demonstrated with this experiment. However, it does demonstrate the fact that photons must have a rest mass.
4. Big Bang and Cosmology
   All the matter in the universe is often considered today to be the result of a gigantic quantum fluctuation. In the extreme energy phase of the early cosmos, these fluctuations expanded so rapidly that they stabilized and formed the basis for matter as we know it today.
   So, was the fluctuation then halted? This theory should finally be discarded. The existence of electrons alone, at least 66,000 yotta years, fundamentally contradicts it. Furthermore, the recurring statements about an "entire" universe are not a

scientific approach. The total amount of matter in the universe is infinite, like the universe itself. It cannot be determined and described as a value.

In summary, it can be said that physical "nothingness" (the vacuum) contains enough energy to produce real, measurable matter under extreme conditions (strong fields or light collisions).

The mass that is presumably meant here is not "produced"; energy is accompanied by its equivalent mass because $E=m\cdot c^2$. Energy without mass does not exist. The claim that energy in the universe produces matter under extreme conditions is false for two reasons.

1. The postulate denies the fact that energy is matter. The mass of matter therefore does not need to be "produced"; it is already present, because it is mass that accompanies energy.
2. There is no energy that has no mass and only produces mass under extreme conditions.

I find this presentation incomprehensible. How can it be that this experimentally proven relationship of the equivalence of mass and energy is still not understood, so that false interpretations of this kind are commonplace? The solution, however, seems very simple: In current physics, there is no scientific definition of the nature of matter that would simply explain away all these errors.

Finally, the standard AI mode disclaimer appears:
AI answers may contain errors. How true.

With that, I ended my Google search using AI mode.

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The analysis of all these flawed conceptions reveals that research projects have been initiated at renowned universities with the aim of experimentally proving the religious concept of creation. Such an undertaking cannot succeed; it is bound to fail from the outset with a dialectical-materialist approach. Apparently, there are professors at various universities who believe in God but refuse to accept the eternity of matter's existence – that is, the fact that mass and energy are conserved quantities that can neither be created nor destroyed. The concept of creation proves to be an indelible axiom from which they cannot escape. They are still guided by the idea that matter can arise "from nothing" – an absurd line of reasoning not expected from a scientist.

The conservation laws of energy, mass, momentum, and charge, which have been proven both theoretically and practically, are undermined and even partially denied. I merely recall the officially held view that the law of conservation of energy does not apply to the universe “as a whole.”

And still, in all the questionable claims about the nature of objective reality, matter is equated with mass, which is the root cause of these bizarre ideas. Energy is not considered to matter; it is understood as something other than matter, a view that constantly leads to the declaration of a possible conversion process from mass to energy and vice versa. Such a process is outside the realm of any physical thought (13), (14), (15). This general chaos in the understanding of the nature of matter, which sometimes extends to the complete rejection of the need for a clear definition, is the main cause of the predicament in which theoretical physics currently finds itself (4).

Many researchers at universities use the extensive and convenient technical resources available there to conduct complex experiments with the aim of proving the possibility of matter arising from nothing. The results of such work could certainly provide or

solidify physical insights if they were not misinterpreted based on such unscientific beliefs. Mathematics is violently appropriated, using false initial assumptions to generate completely erroneous results, which are then presented as proof of the misguided claims. I am thinking, for example, of the calculation of the so-called "age" of the universe as 13.816 billion years.

Furthermore, there are repeated attempts to materialize mathematical abstractions that serve to enable or facilitate calculations related to experimental observations and to assign them an independent existence in reality. This attempts to establish mathematics as the primary force over the observation of nature. This leads various scientists to such absurd representations that the world consists solely of binary values, of zeros and ones (8).

It all begins with very basic concepts, where a force is attributed with motion, as if it propagated through space – at the speed of light, like it is said. “Gravitational waves” propagate through space, like is still claimed. However, the possibility of their existence was refuted by Einstein as early as 1938 (11). The explanation is roughly on par with how a certain Mr. Manuel Krüger once tried to explain to me, with childlike naivety, that magnetic forces are subject to motion, which becomes visible when you move a magnet under a plate covered with iron filings.

In the majority of sources, space is treated as a material object, like a container into which matter can be added or removed. It is even claimed that this container can expand, rotate, bend, compress, and perform other movements – a completely inaccurate assumption that justifies the proclamation of an "inflationary phase" after the "origin" of the universe following a "Big Bang." How far removed such thinking is from a scientific method seems to have no effect on the minds of its proponents.

As early as 1900, Max Planck demonstrated that energy cannot be a continuous quantity when reduced to the microscopic level. There must be a minimum quantity, a smallest possible energy packet, an energy action quantum, whose size cannot be undercut. Planck drew this conclusion from observing irregularities in blackbody radiation in the ultraviolet range, where the emitted energy should approach infinity with a finite increase in frequency. This effect became known as the ultraviolet catastrophe. This discrepancy could be resolved using Planck's constant, also known as Planck's quantum of action. Later, this constant, which Planck himself initially called a "mathematical trick," was proven by Einstein to be a universal constant of nature. However, no one concluded, based on the equivalence of mass and energy, that mass must also be quantized, because otherwise the mass-energy equivalence would be invalid in the microscopic range. It is still claimed that mass is not quantized, that there is no universal quantum of mass action. In my work described in (1) and (2), I attempt to clarify this misconception.

Another fundamental problem is found in cosmology. Adherence to the Big Bang hypothesis, which postulates the origin of the universe 13.8 billion years ago and its subsequent, as is still claimed, accelerated expansion, leads to truly curious assertions. Aside from the nonsense that the universe arose from nothing or from a singularity of infinite energy density of so-called "pure" energy that has no mass, it is believed that there must be a constant, Called the Hubble constant, it states the distance [Mpc] at which cosmic objects are moving away from each other at what speed [km/s]. However, observation contradicts this thesis; such a constant has not yet been determined. Nor will it be found, because this relationship does not exist (5), (6). This, however, does not lead to a verification of the theory's correctness; instead, the concept of "Hubble stress" is constructed, behind which this error is concealed. In reality, there is no general – neither linear nor accelerated – expansion of the universe,

because cosmic matter is chaotically distributed in infinite space and did not originate from a single point.

Even recent research on the cosmic microwave background radiation (CMBR or CMB), which is still considered proof of the Big Bang hypothesis, shows that errors in its interpretation do not support this proof, but rather that this background radiation reliably refutes the standard model of cosmology (3), (10).

Because of the chaotic distribution and the eternity of matter's existence, one cannot speak of an "age" of the universe, its "early phase," or a "young" universe; I've even heard of a "baby phase." All of this is unfounded nonsense without a logical basis. The universe exists eternally; its matter is in constant chaotic motion, whereby motion is understood to mean any change in structure, composition, and spatial position. The forces driving this motion are the fundamental forces of nature – the strong and weak nuclear forces, the electromagnetic force, and gravity. Controlled by these forces, all cosmic matter, both in the microworld and the macroworld, is in permanent rotation. In the macroworld, this creates temporarily stable cosmic systems, such as single objects, star systems, planetary systems, galaxies, and metagalaxies (9). In the microworld, temporally stable and also unstable elements arise, which characterize the structure of cosmic matter.

Recent measurements have shown that electrons cannot decay; they are at least 66,000 yotta years ($6.6 \cdot 10^{28}$ years) old, a time span that human judgment can no longer distinguish from infinity. This is the lower limit that can be determined using measurement technology; they are presumably even older, if one can even speak of their origin and age at all (7). This means, however, that they can neither be created nor disappear unless they are transformed by particle interactions. This clearly proves that the universe could not have originated 13.8 billion years ago. Nevertheless, cosmologists cling to the Big Bang hypothesis of its origin. A pinnacle of the logical misinterpretation of its proponents is the explanation that electrons originated shortly after the Big Bang and have existed eternally ever since. Now, the 66,000 yotta-years of electron lifespan are roughly 5 trillion times longer than the $13.8 \cdot 10^{9}$ years supposedly required for the existence of the universe. This is a value that was calculated using impenetrable mathematical magic tricks and flawed initial data. Nevertheless, there is no indication that anyone intends to re-examine the Big Bang hypothesis or seek an alternative model that scientifically represents reality (9). In my opinion, common sense no longer allows for any argument on this matter. I have previously compiled a number of such questions, where a lack of logic must be lamented, in a separate article (12).

Thus, it can be concluded that in the 100 years since the existence of quantum physics, enormous successes have been achieved in its introduction into applied physics, leading to a multitude of practical applications that have become indispensable in modern society. In theory, however – that is, in understanding the nature of matter and the connections between the microworld and the macroworld, for example, in developing unified theoretical foundations – physics is on a misguided path that, given the current methods of research, will not be abandoned for a long time to come. This misguided path proves to be an obstacle to the further development of quantum physics.

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