Dynamic Space

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Why do magnets attract each other, and what on earth exists in the space between them?

This has been my long-standing question since childhood.

This question is not merely a question about magnets or magnetic force. It is a question about "space" itself, about the reality of that very "void" which we have assumed to be empty.

The same question applies equally to electric force and gravity. Positive and negative electric charges attract each other. Why? Why do they attract each other? What on earth exists in the space between them? An apple and the Earth attract each other. Why? Why do they attract each other? What on earth exists in the space between the apple and the Earth?

What is space?

This question is not only about attraction. It also includes the old question about light.

Light travels from the Sun to the Earth. What on earth is light, that it can travel such a vast distance at the terrifying speed of 300,000 km per second, circling the Earth seven and a half times in one second? What is this space through which light travels, such that not only sunlight coming from the Sun, but also radio broadcasts and the countless signals of mobile phones are transmitted through it?

What, then, is this space?

This is one of the most essential questions in nature.

To answer this question, great scientists such as Newton, Einstein, Schrödinger, and Richard Feynman have all devoted their efforts, yet humanity has still not come even one single step closer to its essence.

Why do I say that Newton's classical mechanics, Maxwell's electromagnetism, Einstein's relativity, Schrödinger's quantum mechanics, and Richard Feynman's quantum field theory still have not brought us even one single step closer to the essence? The answer is simple!

How can the four fundamental forces of nature — gravity, electromagnetism, the weak force, and the strong force — react differently within the same space, within the same medium?

Because no one yet has an answer to this! That is, almost nothing is still truly known about the structure of space itself!

If electromagnetism, gravity, the weak force, and the strong force all operate within the same universe that we call "space," then this space may not be merely a passive stage. Rather, this space may be the common physical substrate from which the four forces emerge through different symmetries, different response domains, or different excitation structures. My paper is precisely my and ChatGPT's answer to these two questions — What is space? And how do the four forces act within the same space / the same medium? — not as two separate questions, but as the same question viewed from two directions.

It is a continuing attempt to view space not as a passive geometric background, but as an active physical reality capable of supporting waves, particles, interactions, threshold phenomena, and nonlinear structures.

The central idea of this paper is that if we are to understand physical reality more naturally, we should regard space itself as the primary physical entity, and interpret particles and forces as phenomena emerging from local excitations, phase structures, symmetry structures, and dynamic reconfigurations of that space.

The ultimate purpose of my paper is never pure theoretical research. The scientific and technological goal I have pursued throughout my life is to understand not only matter and force, but life itself. I have wanted to understand how order in life emerges, how sensitivity is maintained, how structure organizes itself, and how living complexity can arise from seemingly simple physical materials.

Thus, the scientific and technological mission I have long carried in my heart:

To simulate a single drop of water on a computer!

Not as a simple molecular approximation or a generic numerical fluid model, but as a drop of water understood as a physical system so clear that its emergent dynamic coherence, adaptability, biological organization, and perhaps even the deeper conditions that make life possible — for example, the role of water molecules inside cells as micro-water — can be revealed explicitly at the level of "space" and "quantum field." To many people, a drop of water may seem ordinary. But to me, it is one of the most profound objects in nature. It appears simple on the surface, but its depth is infinite.

The drop of water I wish to simulate is "God's Tear."

Small, transparent, and seemingly common, yet containing within it mysteries far greater than what is outwardly visible — a clue toward unraveling the mystery of life. I believe that if one day we can understand even a single drop of water in its full physical reality, humanity may be able to make this world even a little more livable, even by an inch, through a deeper understanding of life, healing, resilience, and the hidden unity between matter and living order.

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From Magnets to Dynamic Space

The path by which childhood curiosity develops into a foundational program in physics is never linear. Questions often lie dormant for a long time, then return in new forms as experience deepens. For me, the question of what exists between magnets gradually evolved into a far broader scientific challenge. If interaction is real, then the medium that makes it possible may also be real. If fields carry energy and momentum, then the "space" through which they propagate may also possess an intrinsic physical character. If quantum mechanics describes wave structure, then that wave may be not merely an abstract probability amplitude, but a trace of a deeper dynamic substrate.

This line of thought led me to the hypothesis I now call *Dynamic Space*: the hypothesis that space is not emptiness, but a real, structured, dynamically responsive physical medium. In this picture, the usual distinction between "space" and "the contents within space" becomes less fundamental. A particle is not an entity inserted into an empty container. Rather, it emerges as a stable local excitation, resonant mode, or topological sector of that underlying medium itself. Likewise, interaction is not a mysterious action at a distance across a void, but may instead be an expression of how that medium responds, couples, deforms, and reorganizes.

Seen in this way, the problem of the four fundamental interactions also acquires a more unified meaning. If all interactions we know are observed within the same universe, within the same spatial field, then it is natural to ask whether electromagnetism, gravity, the weak force, and the strong force are truly completely separate entities, or whether they are manifestations of one deeper medium appearing through different response domains, symmetry sectors, or topological modes of organization. This manuscript is written a concern for that latter possibility.

This perspective allows us to revisit several conceptual issues that long appeared separate within a single framework. The apparent linearity of Maxwell's equations and the Schrödinger equation may be viewed as the low-energy or low-density limit of a deeper medium response. By contrast, gravitational curvature may be interpreted not as a completely separate phenomenon, but as the nonlinear geometric response of the same substrate when local energy density exceeds a threshold. Measurement, collapse, and quantization may likewise be re-understood not as utterly unknowable mysteries, but as problems of mode selection, boundary stabilization, and dynamic reconfiguration.

Yet this program does not remain only at the level of reinterpretation of existing theory. It is also directed toward a very practical engineering vision. My professional life has been devoted for more than forty years to the design of ultra-high-speed CPU semiconductor

chips. But through all those years, the deepest motivation in my heart for pursuing faster and more powerful processors has been simple: one day, to build a true water-drop simulation engine.

In that sense, the pursuit of high-performance computing has never been merely about speed for its own sake. It has been a journey toward approaching enough computational power to meaningfully reproduce the physical richness contained in a single drop of water. This is exactly why I have regarded exascale, and beyond, as so important. If we wish to understand emergent complexity, life-like organization, and the full multiscale dynamics of matter, then massive computational power is not a luxury, but a necessity.

That is why my pursuit of exascale computing through the development of a 3nm, 0.1V, Super Steep Subthreshold, 100GHz CPU is a unified calling in which my engineering vision and my foundational-physics vision become one.

In that sense, the path from magnets to space, from space to the four forces, from the four forces to quantum structure, from quantum structure to water, and from water to life is not separate from engineering. It is, in the end, one continuous question.

What is the physical order hidden beneath the visible world, and how can we use the understanding of that order for humanity?

My hope is that this work, however small, may contribute to that inquiry. Not only by clarifying the conceptual foundations of physics, but also by contributing to better computation, deeper understanding of matter and life, and the creation of tools that may one day help reduce disease, disaster, and human suffering. If there is one spirit that runs through this manuscript, it is the pursuit of truth not as an isolated intellectual achievement, but as a path that leads to service.

Therefore, this writing is offered with two hearts. One as a scientific proposal, and the other as a personal calling. The technical chapters that follow will develop the mathematical and physical structure of the Dynamic Space framework. But behind all those equations, there is a simpler starting point. I only hope that the reader will remember that there was once a child who looked at two magnets and wondered what existed between them, and an engineer who devoted his entire life to building a simulation engine that might one day understand a single drop of water.

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