Science and Religion: Quantum Physics

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Near or far,
Hiddenly
To each other linked are.
Thou canst not stir a flower
without troubling of a star.
—Francis Thompson

Ancient Witness: 1 Corinthians 13:8-13

We continue in our series. Charles Birch, a biologist, theologian and winner of the prestigious Templeton Prize, wrote:

> *There are no real battles between genuine science and genuine religion. There will always be battles when one or both are bogus.*

Part of being a progressive church is to see religion and science not as in conflict but as complementary. We currently live in a time when science is under attack and we're called to defend it. We're called to be good stewards of resources, but also what is between our ears. The mind is a terrible thing to waste! My point is to *allow scientific understanding to change our model of God*. What I'd like us to do is to *think theologically in light of science*. Just as scientific thought evolves and changes—goes through paradigm shifts—so should religious thinking! Being part of a progressive Christianity means that we always need to be progress-*ing*, it seems to me.

There's a story of when Galileo sat in a pew in church in Pisa, bored by the sermon. So his mind turned to other things. He watched an oil lamp swinging from the ceiling. It must have been set in motion by a puff of wind or perhaps when it was being lit. Since there were no watches in his day, Galileo put his finger on his pulse. The average time of the long swings was the same as the short swings. He measured it time and again, for the sermon was evidently a long one. He discovered what is now known as the uniform motion of the pendulum which keeps the same time whether it swings a large or small arc. It keeps perfect time. Hence the use of the pendulums in clocks from then on. The pendulum is an object. When it is moved off center, it is moved by the gravity of the Earth and tends to move toward the center of the Earth. The Earth is also an object, and the only influence these objects have are the push and pull of other objects that may set them in motion.

Now, science, for the most part, studies objects such as pendulums. And science also studies living things, but it studies them almost exclusively as objects and not as subjects. So says Charles Birch,

> *The heart is studied as a pump. The brain is studied as a computer. The procedure of most science is to reduce all it studies to what it regards as the ultimate objects that are supposed to constitute them—atoms, electrons, and so on.*

And while this way of looking at things has answered many questions, it has its limitations. The human body is not just an object, nor are the cells that compose it. Even the new physics itself is helping us see the limited of this approach.

Theologian and physicist, John Polkinghorne, said that when he started research in theoretical physics years ago, they believed that matter consisted of atoms made up of electrons going round a nucleus, and that the nucleus was made up of particles called protons and neutrons. Since then they discovered that the protons and neutrons are themselves made up of yet smaller particles. These are the celebrated quarks and the particles that make them stick together, which are called gluons. A decade ago scientists announced the verification of a new quantum particle called the Higgs boson. This is how physics proceeds, pulling things apart into smaller and smaller pieces. But the question is, in the end, are we just immensely complicated collections of quarks, gluons, photons and electrons?

The people who say yes to this question are called reductionists. In their view, the whole reduces simply to the collection of the parts. But there are also those who maintain that the whole is more than the sum of the parts. There is much more to things that meets the eye.

Ironically, it is science itself that leads us to understand the limits of science and that the world is not just a collection of objects that fit together in a predictable machine. When we enter the world of quantum physics, one to the first things we learn is that it is a radically random world that is unpredictable and unmechanical. Polkinghorne wrote,

> *We cannot tell precisely what the outcome of a quantum event will be. If we look for an electron, we may find it "here" or we may find it "there." We can assign probabilities for these discoveries—so that, maybe, we can predict that most of the time when we look, it will be found "here"—but we cannot say where it will actually be located on any particular occasion on which we try to find this out.*

Someone has likened it to life insurance. The actuaries don't know when you're going to die; they only know the probability of death for someone of your age in the course of the next few years. If they collect premiums from enough people, they will be O.K. Whatever the individual fluctuations, the behavior of a big enough group will still be sufficiently predictable. And so we can predict larger objects, such as molecules, only because there is a large enough group of smaller, unpredictable ones.

In the famous double slit experiment, we see that electrons act both like *waves*, which are continuous, extended and interact in terms of phase, and like *particles*, which are discontinuous, localized and interact in terms of momentum. Furthermore, simply observing them changes the way that they act! And so they are seen not as objects but as probability waves that exist relative to the observer.

Now scientifically and religiously, this underscores the notion that no matter how good a theory we have, we don't have all the answers. Our theories can only describe reality in part. We need to have humility because some things defy our understanding and analysis. As Paul wrote, we

know only in part, we see as through a glass dimly. But this also underscores another important idea, and that is the future is not determined. We are not heading to one unavoidable conclusion, but the future is open. Change is possible. The world is not just a giant machine. Once again, religion and the new physics have some correspondence—the world is not simply mechanical.

There is another, less well-known idea that comes from quantum theory. It comes from the theory that once two electrons (or any part of quantum particles) have interacted with each other, they can still influence each other no matter how far apart they are separated. For example, if one electron stays in the laboratory and the other goes "beyond the moon," then anything I do to the electron here will have an immediate effect on its distant sister. In other words, there is a surprising "togetherness in separation" built into the fabric of the quantum world. Schrodinger called this "entanglement," and John Bell later verified this in the lab. About twenty-five years ago, Polkinghorne said:

> *Einstein was one of the first people to see that this was so, and he thought it was so crazy that he believed that it showed there must be something wrong with quantum theory. However, about ten years ago, some Frenchmen did some very clever experiments that showed that this strange togetherness is indeed the case… Something very significant is happening here. Elementary particle physicists try to tear things apart, but physical reality, it seems, fights back.*

Once again, this perspective that reality is interconnected comes as no surprise to those of us in the religious communities. To the quantum physicist, no component of the universe has reality independent of the entirety.

Buddhists say we don't exist independently and use the term, "inter-being." We "inter-are." The Dalai Lama sees a resonance of quantum physics with the Buddhist theory of emptiness, which says all things are devoid of objective, independent existence. Things are interdependent and in relation. Alan Watts, who was one of the first to bring Buddhism to the West, said, "You are something that the Whole Universe is doing, in the same way that a wave is something that the Whole Ocean is doing."

Scientist Ed Lorenz, of Chaos Theory fame, years ago was trying to model the behavior of the earth's weather system. To his intense surprise, he found that the smallest variation in the input to his equations produced exponentially large deviations in the behavior of his solutions. This was called the "butterfly effect." A butterfly stirring the air with its wings in the African jungle today can have consequences for storm systems over Boston within three weeks.

In other words, the world is made up of systems or chains of events that are so sensitive and interrelated that defy calculation. Quantum physicist David Bohm said,

> *What is needed… is to give up altogether the notion that the world is constituted of basic objects or "building blocks." Rather, one has to view the world in terms of universal flux of events and processes.*

The new physics demonstrates that the predictable mechanical world view of building blocks doesn't work either on the very small scale or the very large scale.

There are some people who are saying that science has had no way of dealing with subjects until quite recently, and that we are experiencing a transition period in science to include the world of inner experience. Some say that quantum physics points to a reality in which mind and matter are aspects of the same thing, two sides of the same coin. Newtonian physics took for granted the separation of the world into matter and mind. Quantum physics makes no such separation.

I find this interesting. Not that it offers an indisputable argument for the spiritual presence, but that it sound like what the mystics and poets have been saying for years. Paul wrote, "God's divine nature, invisible though it is, is seen through all things." (Roman 1:28)

Bernard d'Espagnat, a French physicist and philosopher of science, said that unlike classical physics, quantum mechanics cannot describe the world as it really is—it can only make predictions for outcomes of our observations. "There must exist, beyond mere appearances," he said, "a 'veiled reality' that science does not describe but only glimpses…" This veiled reality is a hidden yet unifying domain beneath what is perceived as space, time, matter and energy. At times, he calls this veiled reality "a great, hypercosmic God."

This sounds like Paul, who wrote that in the Christ-spirit "all things hang together" (Col.1 17) and Luke, who wrote, "in God we live, move and have our being." (Acts 17:28)

In his book on mysticism, Willigis Jager says that in the mystic's view of reality there is also this "togetherness in separation." Mind and matter are two aspects of the same thing. There is the aspect of form, matter or multiplicity on one hand. And on the other hand, there is the aspect of unity, mind or the whole. And mystical experience is the experience of this whole, and its goal is the grasp of both of these aspects, both of these sides of reality, as one. That is, reality consists of both an internal and external aspect. And the internal/subjective/spirit/soul aspect, which cannot be directly observed. And the hidden, veiled reality of the sacred is integral to existence itself.

In Buddhism this is explained with the notion of a "golden lion." Gold can only appear in one form or another, such as a lion. Therefore, form and gold are one, but gold is not lion and lion is not gold. They are not the same thing, but they can occur together; they need each other to appear; they are coexistent. In Christian terms, there is creation and there is the Absolute. And they need each other to appear.

There is a connectedness, an unknowableness, to the world that we can only know and describe partially. There is a hope because the future is open and not determined like a wind-up toy. There is an inner, hidden aspect to all things big and small. At its highest level in human form, we call it "mind." And it is through this inner, hidden aspect that God is present to the world. The mind or spirit of God touches the mind or soul of all reality.

We are all connected. We are connected externally as we have known. But we are also connected internally. This inner connection points to an original oneness and the unity of reality itself. And you could say that love is simply the awareness that we are part of each other. As Paul wrote, everything else may come to an end, but love endures—our connectedness and being inextricably part of others and the whole—this endures. In our tradition, "communion" describes that this is how things are, that at the deepest level, reality is one. As the poet, Francis Thompson, wrote:

All things by immortal power,
Near or far,
Hiddenly
To each other linked are.
Thou canst not stir a flower
without troubling of a star.

Friends, the language of this inner linkage is love. Amen.

(NOTE: The spoken sermon, available online, may differ slightly in phrasing and detail from this manuscript version.)