

Quantum Entanglement: *A new telling of the cosmic story*

Sarbmeet Kanwal, PhD

The Nobel Prize in Physics for 2022 was awarded jointly to Alain Aspect, John Clauser and Anton Zeilinger for groundbreaking experiments that proved a profoundly strange quantum property of reality called entanglement. When two widely separated particles are entangled, they behave like a single unit despite having no conceivable way of communicating with each other. Einstein famously labeled this bizarre phenomenon: *spooky action at a distance*.

Media write-ups on this announcement have been hyping up the commercial applications of entanglement: *quantum computing and quantum encryption*. I have yet to see any discussion on the philosophical implications of this mind-boggling discovery. The bias towards focusing on materialistic applications of science and avoiding its wisdom fallout is endemic to all western cultures.

Quantum entanglement is revolutionary in its implications for the kind of reality in which we live. It points to a new kind of wholeness that heretofore has only been talked about by mystics and philosophers of religion. A wholeness that defies any attempts to reduce it to a set of separable parts. A wholeness that is so antithetical to the reductionist philosophy that drives all of science that most physicists of that time refused to accept it. The Nobel Prize this year was awarded to the three physicists who produced indisputable experimental evidence to show that no future discoveries can ever change the truth about entangled wholeness, i.e., that an entangled property can never be ascribed to either particle; it is a property of the whole. Their work ended a half-century of controversy over the validity of quantum entanglement. The greatest revolution in physics was here to stay.

Are there different types of wholeness?

Wholeness can come about at many different levels. The simplest wholeness is one that merely serves as a label to refer to a collection of things. This wholeness is just a simple sum of parts. A stronger level of wholeness is created when there is some kind of connection or relationship between the parts. This could be just an attraction like the one that brings isolated atoms together to form molecules. It could even be a shared narrative, like a belief system, that binds a group of individuals into a community.

Emergent wholeness comes about when the properties associated with the whole are totally different from the properties of any of its constituents. Hydrogen and oxygen are gases, but they combine to form water, which is a liquid. Atoms cannot make copies of themselves but given the right environment, a DNA molecule made from just atoms can reproduce itself again and again.

One can also talk about an *evolutionary wholeness*. This is a wholeness where individual parts are related because of having a common origin or a shared history. A family unit is an example of such a whole. The great cosmic story of our origin reveals that every entity in our cosmos resides inside a single universe-wide evolutionary wholeness, giving us a new context for our existence.

What is entangled wholeness?

Quantum entanglement is a new kind of wholeness. Entanglement happens when an interaction between two or more particles results in one or more of their properties becoming ambiguous or uncertain. In quantum theory all particle properties are tied to their interactions with other entities. Therefore, a series of interactions can disunite a particle from all of its properties. Such particles have no identity of their own. They only exist in relation to other particles. *The whole then becomes an entangled web of relationality, where parts have surrendered their identity and even their meaning to the whole that subsumes them.* Their meaning now lies solely in the future possibilities of what the whole can become.

Quantum entanglement is the discovery that has confronted science with its own limits. Science progresses through a process of reduction and analysis. It breaks a whole into components and studies their interactions to explain the structure and behavior of the whole. An entangled whole cannot be analyzed in this manner. Its wholeness cannot be broken down. This is why it took so long for science to come to terms with this profound revelation. Science has continued to make progress using what its process is set up to do – go into deeper levels of breakdown and analysis. *It is for philosophers, visionaries, and poets to explore the wisdom that emerges from extending and applying this new paradigm of interdependent wholeness to the story of our cosmic evolution.*

How is entangled wholeness related to evolution?

Entangled wholeness arises from correlations between future events, not from connections between past ones. It is an expression of inter-dependence between

parts, not of a commonality between them. Its relationality comes from entangled possibilities not from shared histories. These future possibilities are evoked into being through the interaction of the whole with its surrounding environment, which is nothing but a bigger whole that holds the entangled whole in a gentle embrace. Which possibilities of the entangled whole get evoked is determined by the nature of its interaction with the bigger whole. The interaction generally favors one set of outcomes over others. In poetic language one can say that *the bigger whole guides the smaller ones to evolve in a preferred direction.*

The idea of a greater whole providing guidance for the realization of smaller ones is a beautiful paradigm that leads to a new telling of the cosmic story. The current narrative talks about cosmic allurements that commune a set of differentiated objects together to create new emergent entities. The universe assembles itself subjectively, piece by piece. The scope of the universe's creativity may be awe inspiring, but this is still a reductionist telling of our origin story. *Quantum theory furnishes us with a more holistic approach to cosmic evolution.*

We no longer need to talk about parts coming together through attraction. It is actually a whole, whose parts have no meaning in isolation, that is being guided by a bigger whole to further the cause of evolution. It is the interaction of an evolving whole with a bigger whole that calls its future possibilities into evocation. One can say an existing whole holds the space for new wholes to emerge, which in turn hold the space for yet newer wholes to emerge and so it goes. *Evolution is a progression of wholes; parts exist only to facilitate the creation of new wholes.*

How is entanglement related to holons?

This powerful approach to viewing the cosmic story is called the theory of holons. The holon paradigm is in direct contrast to our modern hierarchical approach to organization, driven by individuals tasked with providing guidance to a collective. *In holon theory, it is the whole that provides transformative guidance to the parts towards helping them organize into new wholes.* This is why the theory of holons is sometimes also referred to as *holarchy*.

Examples of holarchy and interdependent relationality pervade the cosmic story from the beginning to the current point in our journey. The story can now be told using the language of entanglement and holons.

Newton's idea of a gravitational force between particles has now been replaced by Einstein's theory where it is not force but the graceful curvature of space and time that brings objects together. It is the loving embrace of the whole universe, exercised through the sweeping curvaceous arms of space itself, that brings the giant clouds of hydrogen together into beautiful spiral galaxies.

It is the whole of a galaxy with its gas, dust, nebulas, and stars that guides the dynamics where planets can take birth. An isolated star has no meaning and no consequences. Without the context of a galaxy, a star is nothing but a pointless blip in space and time.

It is a whole planet with its molten core, volcanic geology, liquid oceans, atmospheric gases, and the warmth radiated by its star that guides organic molecules to create living cells. Assembling a bunch of atoms together into a DNA molecule without the context of a planetary whole is a certain dead end.

It is a whole ecosystem with its flora and fauna, its predators and prey, its soil and microbes, its weather and climate that guides the evolution of multicellular organisms. Synergistic cooperation and genetic mutations alone cannot accomplish the amazing dynamics that has led to self-aware life on Earth.

Where is the guidance to create new wholes going to come from?

Uniting a fragmented human psyche and healing a fractured earth community is not going to happen through building of a bridge here and restoring a connection there. It can only happen by getting into tune with the guidance that comes from the greater wholes that we inhabit. These are the wholes that the mystics have been talking about for thousands of years. The whole of the ecosystem in which we live. The whole of our planet in its full splendor with its plant and animal life, its forests, mountains, streams, and oceans. The whole of our sky in its full depth, resplendent with its stars, galaxies, nebulae, and planets. The whole of space, time, quantum fields and the seamless ground from which the universe sprang forth and to which it owes its existence minute by minute.

We must find ways to connect with the whole of the cosmos using the whole of our consciousness and psyche. Our diverse faith traditions, our spiritually inspired rituals, poetry, and other art forms all offer us pathways to strengthening our links to the wholes that have given rise to us. Even the science of entanglement now

suggests that what we need is to shift our identity from our individual egos to the wholes that are waiting to offer us guidance on the creation of new wholes. Only then can the healing and the harmonization of the Earth community take place. Only then can the holarchy of the cosmos continue its journey forward.