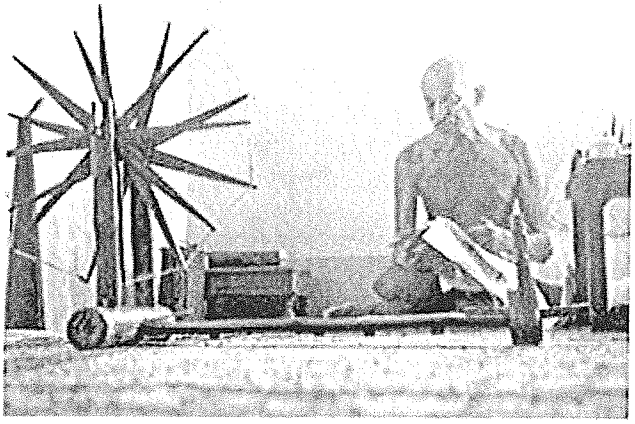

Physicist MANILAL BHAUMIK shares memories of his teenage week with Gandhiji. The 87-year-old physicist was in Delhi to deliver the first Gandhi-related talk at the Sahitya Akademi to inaugurate Bapu's year-long 150th birthday celebrations

Before Christmas 1945, one fine morning, my father was remarkably exuberant. With great delight, he announced that our iconic Gandhiji was coming to visit the obscure, remote little village where we subsisted with bare necessity. It gave us a colossal moral boost, just after emerging from the ravages of the notorious Bengal famine when three million people perished, because of the sheer apathy of the colonial power.

My father was a foot soldier in Gandhiji's movement, more than willing to die for it, as in fact, another great soul and mentor of my youth, Mantangini Hazra, had done. My father proudly informed me that I, at the age of fourteen, was to have the privilege of working as a volunteer in Gandhiji's camp, seeing the legendary man in flesh and blood. From hearing the valiant tales of all his epic actions since my childhood, I envisioned a giant, a heroic figure out of the Ramayana.

But it was not that kind of giant who took his place on the small wooden platform to address us the first afternoon.

I thought, "Is that all there is to him?" He sat, four-fifths naked and there was not a whisper of vanity in his bearing. I was amazed to see that he was no taller than me. But as he spoke, his smallness became outsized and the extent of his spirit filled our entire camp, moving like a fog and reaching the far ranks of our ragged army of volunteers. He was more fully and more truly 'within himself' than any individual I have ever encountered, yet he was never disengaged. There was too much work to be done. And he did it with such discipline that one could set his watch just by looking what he was doing at any particular time of the day.

His day started at 4 am sharp, conducting a prayer session in the camp. We chanted Raghupati Raghava Raja Ram almost every day. His daily activities included a long walk and spending quite a while at the charkha. While spinning, he was so totally focused that it seemed as if he was in deep meditation. His meals consisted mostly of ground up vegetables and goat milk, as he believed one should eat to maintain health and not to satisfy the taste buds.

Every afternoon there was a long public prayer meeting. Looking from the bank of the canal where he sat, one could gaze at an endless sea of humanity before us. I have never seen any such spectacle in my entire life. People came, walking for days from distant villages, only to have a long-distance glimpse at their revered icon. The entire week is still so fresh in my memory, etched there forever.

It was an immense gift to me at a turning point in my impressionable young life. As a way of returning that gift, I want to imagine what I might discuss with Gandhiji today, knowing what I know as a scientist about the nature of the physical universe, and realising that our daily physical world is only the tip of the iceberg. This knowledge from modern science is perhaps the one thing I could share with him in return for what he gave me as a boy.

For without his influence, I might never have freed myself from the iron grip of poverty and despair in my native village and travelled, with a few dollars in my pocket, to a new land to find my calling in science.

Gandhiji seems to have been a believer in the notion that sometimes one must leave one's native land in order to gain a broader vision as he himself did. But the concept also entails bringing a message of spiritual truth to that new world, and ultimately, bringing a new synthesis back home. Today, I come home to celebrate the beginning of the year-long 150th birthday of Gandhiji with you, a day that has been declared by the UN General Assembly as the International Day of Non-violence. I would like to attempt a modest synthesis of his spiritual thoughts and my own, now anchored in quantum physics and modern cosmology.

Ever since Rene Descartes, it has been difficult for those who would seek to reconcile science with spirituality. For those who believe, with Gandhiji, that "A science, to be science, must afford the fullest scope for satisfying the hunger of body, mind and soul," it has been, perhaps, not a time of famine, but certainly no feast. The curtain that parted briefly in the last century to allow spirit into science — from the efforts of theosophists who so influenced M K Gandhi as a young man in London; to the metaphysical speculations of quantum pioneers like Max Planck and Erwin Schrödinger; to Einstein's sense that mental states like 'wonder' and 'awe' should be as much part of scientific discovery as religious experience, and to the publication of books like The Tao of Physics that began to argue that the languages of science and high spirituality were not so very different — yes, that curtain has, for the time being, drawn shut.

We now seem to be either hard-eyed rationalists or wild-eyed zealots. While science has discovered the truth that would quash any form of fundamentalism, yet deeply spiritual in their implications — if only the scientists would step away from their blackboards for long enough to see it. They dare not. Atheism, once proud of its dispassion, has become rather 'militant.' Once again, a dichotomy: you either are or you aren't. No in-between. And if you are religious, you had better be orthodox or be suspect. This is not a recipe for Satyagraha, for, the central tenet of Satyagraha, is truth. This must also be the central tenet of science.

It is hard to say what our revered Bapu would have thought of all of this. He was an advocate of unification, not factionalism. A Hindu raised in a devout Hindu home, as Indian as the water of the Ganga, yet shaped by his schooling and his wide travels to be an ecumenical, even cosmopolitan personage. He was contemplative by nature, and yet knew that only through action could great spiritual movements be realised. My hunch is that, looking around the world today, he would sigh, draw into his extraordinary self-containment, and resolve through his meditative discipline, his great common sense, and his keen political acumen, to once again make the world's cause a single cause.

For Gandhiji, God was entirely without form or attributes. He chanted the Ramanama throughout his life, but he asked, "Is there one God for the Musalmans and another for the Hindus, Parsis or Christians? No, there is only one God. He is named variously and we remember Him by the name which is most familiar to us."

Brahmn the Supreme God of Hindus, is mysterious, because, like the reality discovered by modern physics, it is so abstract.

Einstein, with his keen insight, was the first scientist to have ever envisioned an ultimate unification of all that exists in the universe. Brahmn simply is, eternal, indestructible, indescribable, blissfully immersed in Himself and his creation. This also describes what Albert Einstein called 'Spinoza's god.' A god in and of Nature, yet also transcendent; a god in the world and not of it, and this, too, is the picture of reality shown to us by contemporary science. We live in a world that is simultaneously "classical" and "quantum," a world of things that are palpable and things that are so abstract, which perhaps never will be. This, incidentally, also describes Gandhiji as I remember him.

So, what would I like to tell my erstwhile teacher about the ways in which the most advanced science has come to validate much of what he knew intuitively? What would I say if, after a lifetime in science, I could once again sit with him after his simple dinner? I think I would begin with Einstein. The two men had much in common. They were, first of all, contemporaries, who were born and who died within a decade of one another. They had both stood witness to, and grappled with the horror of the twentieth century and the gross realities of imperial power exercised to the point of savagery. The answer both men gave to these realities was to pursue peace passionately, through devotion to truth.

Although it does not seem that their paths ever crossed in life, Einstein declared on the occasion of Gandhiji's 70th birthday, "Generations to come, it may well be, will scarce believe that such a man as this one ever in flesh and blood walked upon this earth." Einstein also asserted his belief that "Gandhi's views were the most enlightened of all the political men of our time. We should strive to do things in his spirit: not to use violence in fighting for our cause, but by non-participation in anything you believe is evil." Einstein, though a non-observant Jew, was no atheist, and in his thinking, was never far from God as a concept for wholeness, which, in a very real sense, is also what Brahmn is. Gandhiji was devoted to the doctrine of Sarvodaya, which taught that real change must occur holistically, beginning in the

heart and extending to the rim of the world.

I would bring the common threads to Bapu's attention, in an attempt to spin them together on his mental charkha. It also begins to sound like something Gandhiji taught me on one of those magical nights. I was stuck, as children and even many adults tend to be, on the notion of Brahmn as a personage or an object, and when someone asked him, "How can God be law? How can God be love?" He smiled and said the answer would be evident when I was ready for it, and in the meantime to pay attention to that 'still, small voice' in my heart.

Of course God can be law, because law is what preserves, as Vishnu, an aspect of Brahmn, preserves. God can be love, because God, as Brahmn, creates, and this is a loving act. Lastly, God can contain all the forces of the universe, and these forces are in the hands of Shiva, often to violent and destructive ends, which—like the explosion of a supernova—make new worlds. If I stood with Gandhiji now, I might add that God can be all of these things if his nature is that of a potentiality rather than a definable state. Such a potentiality existed at the beginning of time and exists today at the very foundation of space. Brahmn, also, is 'non-local' in the sense that He is omnipresent.

I would tell him that science has discovered the fundamental ground of reality that consists of the utterly abstract quantum fields, woven on a cosmic loom, and that everywhere through eternity, the laws that govern these fields and particles created by them, as their excitations—particles that eventually become us—are exactly the same. Ultimately, the fields have a common origin and always exist being inseparably intertwined with all of creation. The universe at its core is an undivided oneness. This is a pretty good description of Brahmn. And this is what we in science see when the veil of maya is withdrawn—though few of us will describe it this way!

Then, as we prepared to snuff out the lamps for the night, I would attempt to jump the most difficult 'leap of faith' required if science and religion are to find common ground. I would ask Gandhiji to wrap his great mind around the notion that—at present—the customary way for science to understand how God manifests is through mathematics. That beyond our daily physical world exists a matrix of mathematical constructions that serve as a kind of code for something that, despite the best efforts of poets, mystics, and mathematicians, is not tangibly describable. A code name for God perhaps! But that these mathematical constructs, like the equations of quantum fields, represent something that is as real as the physical world around us.

I have a feeling I know what Gandhiji would do. Bear in mind that he had an analytical mind. He had been a lawyer before a saint. And a man does not plot the end of an empire without certain feats of mental virtuosity! Gandhiji would turn to me slowly and with a wrinkle in his high forehead, say, "There is an indefinable mysterious Power that pervades everything. I feel it, though I do not see it. It is this unseen Power which makes itself felt and yet, defies all proof, because it is so unlike all that I perceive through my senses. It transcends the senses. But it is possible to reason out the existence of God to a limited extent."

And what do those reasons, and the countless experiments done to test them, reveal?

They reveal that the fundamental reality that lies behind and within our perception of the everyday world is not particulate, as was believed by Democritus and the Greeks, and the great scientists of the Islamic golden age, and in the Western world right up to the time of Einstein, but something much closer to the reality perceived by the gifted rishis of Vedic tradition through contemplation, who contended that the

source of reality lies in the changeless—and that this changelessness is, in fact, the distinguishing factor between what is fundamental and what is merely a transitory state of physical existence.

The 'particles' that we have all been taught to imagine and even to depict—things like protons, neutrons and electrons, and their constituent quarks and gluons, and others too exotic to name—do 'exist,' but only as mere excitations of an underlying reality that is far greater, pervasive, and unchanging on an average from one 'end' of the universe to the other. This is the reality of quantum fields, as demonstrated by Quantum Field Theory and its numerous corollaries. The use of the word 'fields' derives, in this case, from the notion of a field of force, such as a gravitational or electromagnetic field.

The quantum fields are always alive with infinite dynamism, which have special characteristics. Any particular event of activity is totally spontaneous and completely unpredictable, yet across the incalculable breadth of the cosmos, the fields on an average have remained remarkably immutable since almost the beginning of time...as if the same gardener had been looking after them all!

For what we have given the name 'electron,' the carrier of electric charge, there is an electron field. For what we have whimsically called 'quarks,' there are quark fields. The same is true for all the particles yet identified under what is called the Standard Model of particle physics. And science tiptoes closer each day to affirming that the granddaddy of all fields—the gravitational field—manifests excitations called, appropriately, 'gravitons.' Now you may well ask, as Einstein did, why we need so many fields. Einstein, as you'll recall, famously equated mass with energy, thus demonstrating that all forms of matter were, "simply quanta of energy."

Why not just a single field to produce them all? As an Advaita Vedantist might answer, this is a matter of function—of the manifest as opposed to that which is beyond manifestation. Brahma, Vishnu, and Shiva are like fields. Each has a necessary function in the maintenance of the universe, yet each has its source in Brahmn. Is it not possible that a greater, more primary field underlies the force and matter fields that we now identify as the matrices of the physical world? That it existed before the others, and continues to exist, changeless and eternal. The possible existence of such a 'Source Field' is, in a nutshell, the subject of my book, Code Name God, which was republished in a new Penguin edition last year.

Although the book has been published in about a dozen languages worldwide, it's most ardent readers seem to have been from India. Perhaps because for the first time a scientist has made a credible attempt to bring Brahmn into science and science into Brahmn. After all, the capacity for abstract thinking blossomed possibly earliest here in the land of India about 5000 years ago and that contemplative tradition continues uninterrupted, making it the oldest continuous system of thought in the world. Although much of this thought was directed toward spiritual quest, mathematical abstraction flourished side-by-side under names like Aryabhatta and Brahmagupta. In other words, we are up to the task!

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