

# The Physics of *Sachchidānanda*<sup>1</sup>

Ulrich Mohrhoff

Sri Aurobindo International Centre of Education

Pondicherry 605002 India

ujm@auromail.net

Synopsis: A twenty-five centuries old paradigm has passed its expiry date. It is no longer appropriate to ask: what are the ultimate building blocks and how do they interact and combine? The right questions proceed from the assumption that what ultimately exists is a single, intrinsically ineffable Being. How does this manifest itself? How does it come to constitute an apparent multitude of objects? After treating you to the answers from contemporary physics, I turn to the deeper answers from Indian philosophy in general and Sri Aurobindo in particular. That intrinsically ineffable Being relates to its manifestation in a threefold manner: it is the substance that constitutes, the consciousness that contains, and an infinite Quality-Delight that expresses and experiences itself. By a multiple exclusive concentration it assumes, first, the aspect of a multitude of separate selves and, last, the aspect of a multitude of formless particles — the latter in order to set the stage for the Adventure of Evolution. I conclude by explaining why the laws of physics are essentially tautological: if you want to set the stage for evolution via a process that results in a multitude of formless particles, then these laws must have exactly the form that they do.

## Quantum matters (*sat*)

Quantum mechanics is the general theoretical framework of contemporary physics. When properly interrogated, it tells us that a twenty-five centuries old paradigm has passed its expiry date. It is no longer appropriate to ask: what are the ultimate building blocks and how do they interact and combine? The notorious difficulty of making sense of the quantum world is not that we don't understand Nature's answers. It is due to the fact that Nature fails to make sense of our questions.

The right questions to ask proceed from the assumption that what ultimately exists is a single, intrinsically ineffable Being. How does this manifest itself? How does it come to constitute an apparent multitude of objects? How does it realize their properties? If you turn to quantum mechanics with questions of this sort, you will be surprised at the simplicity and straightness of the answers you get. Among them is the most economical creation story ever told: by entering into spatial relations with itself, that intrinsically ineffable Being gives rise to both matter and space, for space is nothing but the totality of existing spatial relations, while matter is simply the corresponding apparent multitude of *relata* — apparent because the relations are *self*-relations.

Why *self*-relations? If you consider the so-called "ultimate constituents of matter" by themselves, out of relation to each other, they lack properties. The reason this is so is that all physical properties are defined in terms of *relations*. This includes the shapes of things. The form of a composite object is the totality of its internal spatial relations. Objects lacking internal relations, such as quarks and electrons, are formless. In addition to that, quantum mechanics rules out the existence of intrinsically distinct substances. So if you contemplate any two of the so-called "ultimate constituents" of matter by themselves, you are contemplating one and the same thing *twice*. The true number of "ultimate constituents" is *one*.

---

<sup>1</sup> Presented at *The Collective Yoga of Man: A World in Process*, conference held at Auroville, India, January 12-14, 2007; PHILICA.COM Article number 73.

As said, the right questions to ask proceed from the assumption that what ultimately exists is a single, intrinsically ineffable Being. Why intrinsically ineffable? Well, if properties resolve themselves into relations between Being and Being, there is no property that can be attributed to Being itself.

Of all the weird features of the quantum world, none is more baffling than the supervenience of the microworld on the macroworld. *Supervenience* is a philosophical term for a relation between two types of properties. Properties of type B are said to supervene on properties of type A if objects cannot differ in their B-properties without differing in their A-properties. Here is an example from neurophilosophy: for a devout materialist, mind states supervene on brain states. This means that if two brains are exactly alike then the corresponding minds must have exactly the same thoughts, sensations, perceptions, etc.

The microworld supervenes on the macroworld in the sense that molecules, atoms, and subatomic particles have the properties that they do because of what happens or is the case in the macroworld of tables, chairs, and lab equipment. The properties of the microworld depend on the properties of the macroworld rather than the other way round as we are wont to think. In the quantum world, to *be* is to be *measured*. A property exists only if, only when, and only to the extent that its possession is indicated by a macroscopic event or state of affairs.

If quantum theory tells us how the world is *manifested*, rather than how it is put together, then this dependence of the small on the large is not so very hard to understand. Quantum mechanics affords us a glimpse "behind" the manifested world — the macroworld — at formless particles, non-visualizable atoms, and partly visualizable molecules, which, instead of being the world's constituent parts or structures, are *instrumental* in its manifestation. But we cannot describe what lies "behind" the manifested world except in terms of the finished product — the manifested world. Here is an analogy: if you experience something the like of which you never experienced before, you are obliged to describe it in terms of things that you *did* experience before. The reason for the supervenience of the microscopic on the macroscopic, however, is not merely a lack of *descriptive* terms but a lack of attributable *properties*.

Here is an example. We tend to think of space as an intrinsically divided expanse, which is to say as something that has parts. Hence if we imagine an object and a part or region of space, we tend to think that this object — at any rate, its center-of-mass — has to be either inside or outside that region. In reality, a region of space only exists if it is physically realized — made real — for instance by being the sensitive region of a detector. To be able to say truthfully that a particle is inside a certain region, we need a detector not merely for *indicating* the particle's presence inside that region. In the first place, the detector is needed in order that that region be real and the property of being in it be available for attribution to the particle. If the region is not realized, then it is neither true nor false but *meaningless* to say that the particle is in it.

## Involution (*chit*)

If the quantum world is mysterious, so is consciousness. How can a material thing be conscious? How can there be consciousness of material things? The answer — at any rate, the short version of it — is that there is no such thing as a material thing. There is a single, intrinsically ineffable Being. This manifests itself, and quantum mechanics tells us how. But it does not only manifest itself. It manifests itself *to itself*. It is not only that *by* which the world exists but also the self *for* which the world exists. It is not only the substance that *constitutes* but also the consciousness that *contains*. It is both the *sat* and the *chit* of the Vedantic trinity *sachchidānanda* (*sat-chit-ānanda*).

We have seen, however fleetingly, how the one ineffable Being becomes — without ceasing to be the one ineffable Being — an apparent multitude of propertyless particles. How does the one Self become an apparent multitude of individual selves? We all know first-hand what it means to imagine things. So we can conceive of a consciousness that creates its own content. With a little effort we can also conceive of

this consciousness as simultaneously adopting a multitude of viewpoints within its content. We also know first-hand the phenomenon of exclusive concentration, when awareness is focused on a single object or task while other goings-on are registered or attended to subconsciously, if at all. As Sri Aurobindo explains, it is by such a *multiple exclusive concentration* that the one Self assumes the aspect of a multitude of individual selves and loses sight, in each self, of its identity with the other selves and with the Self of all selves.

Once we have a *multiple* concentration of consciousness, the action by which the one Self creates its content differentiates into a subjective action on the part of each individual qua self and an objective action on the part of each individual qua substance. And once we have an *exclusive* concentration of consciousness — which means *ignorance*, the Vedantic *avidya* — these actions further differentiate, the subjective one into a conscious and a subconscious part, the objective one into a voluntary and an involuntary part.

Ignorance, as we all know, has its degrees. *Sachchidānanda* can deepen its multiple exclusive concentration to the point that its individualized *subjective* action — which is one of Sri Aurobindo's definitions of *mind* — ceases. It can farther deepen its multiple exclusive concentration to the point that even its individualized *objective* action — which of Sri Aurobindo's definitions of *life* — ceases. What then exists is a multitude of *formless* individuals, for it is life (in this particular sense) that is responsible for the existence of individual forms.

Thus it is one and the same process — namely, a multiple exclusive concentration — that produces the multitude of selves and, when carried to its farthest extreme, the multitude of formless particles.

## The adventure of evolution (*ānanda*)

What ultimately exists relates to its manifestation in a threefold manner: it is the substance that constitutes, it is the consciousness that contains, and it is (subjectively speaking) an infinite bliss — *ānanda* — and (objectively speaking) an infinite quality infinitely expressing and experiencing itself.

Then why does it hide in formless particles? Why does it subject their relations to apparently self-effective laws? In this world, *sachchidānanda* is playing Houdini, imprisoning and enchaining itself as rigorously as it can, challenging itself to escape, to re-discover and re-affirm its powers in what seems to be a universe of mechanical forces and random events. Its multiple exclusive concentration allows it to enter various states of ignorance and incapacity so as to experience growth in knowledge and power, the excitement of conquest and discovery, the surprise of the unknown, the challenge of opposition, the triumph of victory.

## Closing the circle

Back to physics. Since the word "fundamental" does not have a comparative, a theory is either fundamental or it is not. If a physical theory is fundamental and complete, then it is capable of explaining everything else and therefore incapable of being explained by anything else — except teleologically, by pointing out the reasons why it has the particular form that it does.

One of the reasons why the general theoretical framework of contemporary physics has the particular form that it does, is that without it stable objects could not exist, specifically, objects that

- have spatial extent (they "occupy space"),
- are composed of a (large but) finite number of objects without spatial extent (particles that do not "occupy space"),
- and are stable (they neither explode nor collapse as soon as they are created).

The existence of such objects *requires* the fundamental theoretical framework of contemporary physics to be exactly what it is, namely quantum mechanics.

Quantum mechanics is a probability calculus. Given the outcomes of measurements that have been made, it allows us to calculate the probabilities of the possible outcomes of measurements that may be made. And that's it.

Because quantum mechanics presupposes measurements, its consistency requires the existence of measurements. And it is eminently plausible that the existence of measurements in turn *requires* the validity of *all empirically tested physical theories* — namely, the so-called "standard model" and Einstein's theory of gravity — at least as effective theories. (An effective theory is a theory that is valid over some but not all scales of length.)

This is a humbling conclusion, for it means that all empirically tested physical theories are essentially *tautological*. If you want spatially extended objects that neither explode nor collapse the moment they are formed, the validity of these theories is a must. To be precise, their validity is guaranteed *if* spatially extended objects are composed of objects that lack spatial extent. This is the sole nontrivial input and the only real mystery. *Why* are things that "occupy space" made of finite numbers of things that don't?

We have seen why. The creation of a world of formless particles is the final stage of an involution that has set the stage for the adventure of evolution.

## Further reading

Sri Aurobindo. *The Life Divine* ( SABCL Vols. 18-19).

Mohrhoff, U. (2000). What quantum mechanics is trying to tell us, *American Journal of Physics* 68, 728-745.

Mohrhoff, U. (2001). Beyond the cookie cutter paradigm. In *Consciousness and its Transformation: Papers presented at the Second International Conference on Integral Psychology* (edited by M. Cornelissen). Pondicherry: Sri Aurobindo International Centre of Education, pp. 333-345.

Mohrhoff, U. (2002). Why the laws of physics are just so. *Foundations of Physics* 32, 1313-1324.

Mohrhoff, U. (2004). Psychology all the way down. Paper presented at the National Conference on Indian Psychology, Yoga, and Consciousness, Pondicherry, 10-13 December, 2004.

Mohrhoff, U. (2005). The Pondicherry interpretation of quantum mechanics: An overview, *PRAMANA—Journal of Physics* 64, 171-185.

Mohrhoff, U. (2006). Is the end in sight for theoretical pseudophysics? In *New Topics in Quantum Physics Research* (edited by V. Krasnoholovets and F. Columbus). New York: Nova Science Publishers.

Mohrhoff, U. The physics and psychology of Brahman (forthcoming).

Mohrhoff, U. Quantum mechanics explained (submitted).

Mohrhoff, U. Particles, consciousness, volition: a Vedantic vision. Accepted for publication in *Noetic Journal*.

Mohrhoff, U. (2006). The Quantum World, the Mind, and the Cookie Cutter Paradigm. Accepted for publication in *Noetic Journal*.

Mohrhoff, U. Inside the Spirit Matrix: A contextualization of contemporary physics, presented at *Approaches to Mind Sciences Emanating from Indian Culture*, conference organized by the Department of Psychology, University of Delhi, India, January 27-29, 2007; PHILICA.COM Article number 82.

(Papers are available for download via <http://thisquantumworld.com>.)