Explain physics with the whole instead of particles

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Physicists usually describe the world from the vantage point of its smallest component parts. But quantum theory does not allow itself to be conceptually crammed into such a framework. Instead, in her dissertation at Uppsala University in Sweden, Barbara Piechocinska takes her point of departure in the mathematics of the dynamic whole and finds that time thereby takes on new meaning.

Throughout the centuries reductionist philosophy has reigned supreme in physics. It has been assumed that it is possible in principle to describe the world by finding the tiniest building blocks and understanding how they interact. Not until the early 20th century was this view of the world seriously challenged, by quantum theory. Quantum theory is regarded as one of the most fundamental of theories, explaining, among other things, the stability of the atom, and it is widely used in technology.

“What’s interesting about quantum theory is that it seems to refuse to be shut up inside a reductionist framework. Instead it seems to indicate that there is an underlying indivisible, in other words holistic, dynamic whole. This means that we should use that as a point of departure and then describe the physical world,” says Barbara Piechocinska.

This is precisely what she has done. In her dissertation she proposes a philosophy that takes dynamics and wholeness as fundamental, instead of static parts that interact. Further, she suggests a mathematical description of this dynamics. Kinetic equations in classical Newtonian mechanics or in quantum theory make no distinction about whether time

goes forward or backward. Dynamics, on the other hand, does, being based on wholeness. But Barbara Piechocinska can't tell whether this is physically relevant or merely a mathematical construction.

"If this approach is elaborated further we will hopefully be able to answer that question. Because then we would see exactly what it predicts and could see whether the predictions square with reality. If it were to be shown that the extra bit is truly relevant in the physical world, then we would have good reason to reconsider our way of looking at the world and dethrone reductionism," she says.