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WHAT DO YOU BELIEVE IS TRUE EVEN THOUGH YOU CANNOT PROVE IT?

The electron has been with us for over a century, laying the foundations to the electronic revolution and all of information technology. It is believed to be a point-like, elementary and indivisible particle. Is it?

The neutrino, more than a million times lighter than the electron, was predicted in the 1920's and discovered in the 1950's. It plays a crucial role in the creation of the stars, the sun and the heavy elements. It is elusive, invisible and weakly interacting. It is also considered fundamental and indivisible. Is it?

Quarks do not exist as free objects, except at extremely tiny distances, deep within the confines of the particles which are constructed from them. Since the 1960's we believe that they are the most fundamental indivisible building blocks of protons, neutrons and nuclei. Are they?

Nature has created two additional, totally unexplained, replicas of the electron, the neutrino and the most abundant quarks, u and d, forming three "generations" of fundamental particles. Each "generation" of particles is identical to the other two in all properties, except that the particle masses are radically different. Since each "generation" includes four fundamental particles, we end up with 12 different particles, which are allegedly indivisible, point-like and elementary. Are they?

The Atom, the nucleus and the proton, each in its own time, were considered elementary and indivisible, only to be replaced later by smaller objects as the fundamental building blocks. How can we be so arrogant as to exclude the possibility that this will happen again? Why would nature arbitrarily produce 12 different objects, with a very orderly pattern of electric charges and "color forces", with simple charge ratios between seemingly unrelated particles (such as the electron and the quark) and with a pattern of masses, which appears to be taken from the results of a lottery? Doesn't this "smell" again of further sub-particle structure?

There is absolutely no experimental evidence for a further substructure within all of these particles. There is no completely satisfactory theory which might explain how such light and tiny particles can contain objects moving with enormous energies, a requirement of quantum mechanics. This is, presumably, why the accepted "party line" of particle physicists is to assume that we already have reached the most fundamental level of the structure of matter.

For over twenty years, the hope has been that the rich spectrum of so-called fundamental particles will be explained as various modes of string vibrations and excitations. The astonishingly tiny string or membrane, rather than the point-like object, is allegedly at the bottom of the ladder describing the structure of matter. However, in spite of absolutely brilliant and ingenious mathematical work, not one experimental number has been explained in more than twenty years, on the basis of the string hypothesis.

Based on common sense and on an observation of the pattern of the known particles, without any experimental evidence and without any comprehensive theory, I have believed for many years, and I continue to believe, that the electron, the neutrino and the quarks are divisible. They are presumably made of different combinations of the same small number (two?) of more fundamental sub-particles. The latter may or may not have the string structure, and may or may not be themselves composites.

Will we live to see the components of the electron?