

Dear Bob,

I read the transcript and am alarmed at the mistakes in it. I hope Rob Bell is not claiming to be a physicist?

Some issues.

1. J.J. Thomson discovered the electron in 1897. He had no part in the discovery of quarks which were not thought about until the 1960's. Thus the sentence "They quickly discovered that an atom can be split into a smaller substance called a "quark" ..." is just plain historical nonsense.
2. His assertion that quarks can be split further and this leads to the multiplicity of sub-atomic particles is also incorrect. Many sub-atomic particles have indeed been found and they are **\*all\*** made up of **\*combinations\*** of quarks. What Bell fails to understand is that there are in fact two major types of quark (in fact there are five). One is called 'up', the other 'down' (the other three are called 'top' or 'truth', 'bottom' or 'beauty' and 'strange'). All fundamental sub-atomic particles are made up of combinations of these quarks. A proton is made of three quarks: two 'up' quarks + one 'down' quark. A neutron is: one 'up' + two 'down' quarks. The theory of quarks was proposed to try and **\*understand\*** the particle zoo and not the way Rob Bell argues. His facts are wrong.
3. Rob Bell mixes up the particles. The particles made up of quarks are called: baryons and mesons, and, include protons and neutrons. They are held together by gluons. Leptons have **\*nothing\*** to do with quarks. The electron and muon are called leptons.
4. Bell's theorem or inequalities were invented by Dr John Bell from CERN in 1965 and not 1949 as claimed by Rob Bell in the article. What follows as a description of Bell's theorem by Rob Bell is patent nonsense. Firstly, you can't split quarks, and, secondly, quarks don't have electrons spinning around them! Bell's theorem was proposed by John Bell to try and mathematically distinguish between two views of Quantum mechanics. One view, held by Einstein, is that property correlations between two objects like a pair of electrons sent in opposite directions, after being created together, are there because they were there at the time of creation. The other view, held by Neils Bohr, is that correlations of properties between the electron pair is **\*not\*** caused by correlations at the time of creation that we can know. The point is extremely subtle and esoteric but Bohr has been proven right experimentally. This requires a lot more delicacy than given here by me to get the point of this.
5. The 'butterfly' effect is **\*definitely\*** not a popularisation of Bell's theorem!! The Butterfly effect comes from chaos theory which says that in some systems, **\*very small\*** differences in starting points of the system, nevertheless means very diverse evolution of the system as time progresses. This is not a Quantum mechanical effect and has nothing to do with quantum mechanics.

6. The sentence "... they've only been able to observe leptons in communities of two and three", is completely incorrect. I think he means quarks not leptons. Leptons is the general name for electrons, muons and tauons. Leptons most certainly do exist by themselves and the other two live momentarily and decay into the electron.
7. "...the universe at its core is unpredictable ..." I think I would prefer unknowable.
8. "... the best we can come up with is that the universe at its core is that the universe at its core is some sort of relational energy ..." The use of 'we' suggest Rob Bell is part of the scientific community. If this is indeed so then I think he is a poor member. The relational energy bit is fanciful and undefined in character. It sounds good but I'm not sure what it means.
9. The rest of the article rambles. The point of circles and rectangles is lost on me. The marker pen is actually a cylinder which viewed in one aspect look like a rectangle and from another perspective looks like a circle. It is true that perspective is important but it is not true that a rectangle is a circle or that confusion exists.

What I have of the article is very weak physics. If his theology is just as bad then I would be very wary of following it.

Hope this helps you.

Frank

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