

INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY

QUANTUM COMPUTING

READING 9

Information, Physics, Quantum: The Search for Links

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October 15, 2019



Abstract

In this text, that is based on the paper: "Information, Physics, Quantum: The Search for Links" by John Archibald Wheeler, two ideas are extracted arbitrarily and discussed, according to the interest of the author.

1 Idea 1

What is physics?

I think that physics is most fundamentally a collection of theories that describe the behaviour of a certain natural phenomenon. Having this set of theories, we can build models to predict quantitatively the behaviour of the phenomenon the theories describe. On these models, we can verify if a certain model works or not using experiments and observations. The activity of measuring something implies to observer participancy, according to very well executed and precise experiments. Observations are very important in the ideas Wheeler propose, for instance, having described how physics gives rise to observational participancy, we can see how entangled are physics and observation. The next step in the trilemma Wheeler proposes is information. Information is created when we observe. We create a framework that captures the phenomenon, this can be called "metadata" and it is important because even when we measure in a given unit, we can transform this information according to our needs.

2 Idea 2

Reality

Following the last line of thought: Measuring and observing has to do with comparison, and with magnitudes. But here, magnitudes is a key concept, because magnitudes are created according to our perception of reality. Our perception of reality is closely related to how we measure things, or how we observe nature, and this is constrained by our senses, this idea is well illustrated by Einstein as *time and space as models by which we think but not conditions in which we live*. We perceive time and space, and in this playground we can interact with matter, and sense light, but this does not guarantee that our senses are enough to explore and know the whole story of the universe. Reality is much more complex to understand than we thought in the XIX century, and the further we progress, it seems more probable that human kind might not be able to understand the universe, before we reach this divine-like understanding, there is a good chance that our societies will be destroyed (maybe even by ourselves), and the fact that we can not reach the ultimate comprehension, and that we do not have unlimited time to observe, might be a blessing. As long as we do not possess the ultimate answer, we can define this quest as our reason to exist, and we are complete in Gödel's terms.

I believe that the closest we can get of understanding the universe is to create beings that have similar cognitive capacities than ours, and that are able to ask fundamental questions and strive towards answers, let us say a science driven AGI. The main differences between *Us and Them* would be that they would be able to exist for much more time than we do, and that they would be able to better collaborate, they would have perfect memories, their observations would not be biased, and they may develop new ways of interacting with their surroundings.

Let us assume that our science driven AGI succeeds and achieves the ultimate understanding of nature, then, what would be its reason to exist?... Maybe with unlimited knowledge and technology they will be able to rescue this very idea and they will just laugh (if they happen to have sense of humour) by how trivial they consider it.