Bit Quântico 6: WHY IS IT WORTH KNOWING MORE ABOUT QUANTUM THEORY?

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[bass intro]

Lu - Hey guys! I'm Luciane Treulieb, journalist and science communicator at the Federal University of Santa Maria and this is our last quantum bit of the season. The title already says it all. Today we're going to talk about why it's worth knowing more about quantum theory.

When we did the interviews for O Q Quântico, this was a question I really wanted to ask our interviewees. We were still at the beginning of the podcast production process, and I didn't really know what to expect from this quantum theory thing. So the answers we received helped us realize why, in fact, it would be worth the work we would put into trying to make a super complex subject like quantum theory accessible.

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Lu - To begin with, just listen to Rafael Chaves, Professor at the Federal University of Rio Grande do Norte:

> **Rafael Chaves:** So I think there's a fundamental component there that needs to be understood, right, the universe we inhabit. Understanding nature, right? And be part of it in some way. So it is perhaps something more fundamental, more philosophical, but it is certainly, let's say, the origin of all this human restlessness, right? To seek knowledge, wisdom, technology, and so on.

Lu - In addition to seeking knowledge, understanding science and the world, Rafael also highlights how quantum theory challenges our pre-established conceptions:

> **Rafael Chaves:** Well, quantum theory forces us, right, to abandon some preconceived ideas about nature, about how the world operates. So I think quantum theory is a good way in this sense, right, to understand that things are not always as they seem to be, right? Reality can be deeper, more interesting, counterintuitive and mysterious.

Lu - Following the same line, Pablo Saldanha, Professor at the Federal University of Minas Gerais, also sees understanding quantum theory as a way to expand thinking, recognize the complexity of the physical world and the importance of science in general.

> **Pablo Saldanha:** Because science is trying to describe this world we live in, right? And there are several branches of science that I think are very important to have at least a fundamental notion of, in order to understand what the world is, right? And I think quantum physics has a very important message that I think is valid for anyone, that the world is very complicated.

Lu - Is the world complicated? It may be, but for Gabriela Lemos, Professor at the Federal University of Rio de Janeiro, it is also magical and beautiful. For her, quantum physics teaches humility by revealing the vastness of the unknown, encouraging the search for new ideas beyond current understanding:

Gabriela Barreto Lemos: The most important thing about quantum physics that it teaches, when you learn it, is to have humility, because you see it like this, in the face of this wealth of phenomena, you know, in a world like this, our mind is small compared to all this. There are things that we really don't realize, you know? That there is something much more... much more magical, I think, much more like that, I don't know if the word is magical, but it is something much more beautiful than what we first realize, like, that behind the things we think we understand, there's a world of things that we don't understand, and the deeper you go, the more you open up, open up, make room for new ideas, like that.

Lu - And these new ideas can generate, among other things, new technologies… Bárbara Amaral, Professor at the University of São Paulo, sees technologies as a good reason for people to learn about quantum theory:

Barbara Amaral: I work with fundamentals of quantum physics, so my motivation is always to try to understand why nature works the way it does. But regardless of that, whether a person has this curiosity or not, I think it's a question of training to live in today's world like this, to be able to understand why the things around you work the way they do, why we can make cell phones smaller and smaller, why we can have smaller and smaller equipment and this is all very linked to quantum physics.

Lu - Rafael Chaves also brought examples of how quantum is omnipresent in our everyday lives:

Rafael Chaves: For example, on this computer here that I'm using to talk to you, there are billions of transistors that only work because we discovered quantum, in other words, they only operate the way they do because there are quantum phenomena involved there. For example in a laser, right? That we can use, for example, to perform surgery and save a life or in an MRI machine. They operate due to quantum phenomena.

Lu - And Marcelo Yamashita, Professor at São Paulo State University, highlights the importance of people understanding how quantum theory works so as not to be vulnerable to charlatans:

> **Marcelo Yamashita:** and a secondary effect of this, once they begin to understand what can, what cannot, what is permitted in nature, what is not, how quantum mechanics actually works, the less they will be deceived by some products or by quantum scams that are permeating society.

Lu - Another Marcelo that we interviewed, Marcelo Schappo, who is a Professor at the Federal Institute of Education, Science and Technology of Santa Catarina, reinforces why understanding science can help people make better decisions about therapies and products that claim to be quantum .

> **Marcelo Schappo:** And the importance of this is a matter of protection. Protection of finances, protection of health, enlightenment of people. If people want to buy or participate in therapies and products, or use quantum products, they can do that. But, at least they will do it in an informed way, they will know that what they are subjecting themselves to is not based on good scientific evidence.

Lu - Finally, another Marcelo, now Marcelo Terra Cunha, Professor at Unicamp, poured praise on us and highlighted the importance of O Q Quântico to help avoid misuse of quantum concepts:

> **Marcelo Terra Cunha:** And so your podcast is very welcome to try to improve the understanding of at least some people and try to permeate good concepts, good understandings of what quantum theory is in society. A more enlightened society is protected from misuse.

Lu - Despite being very diverse, it was possible to find similarities in the responses of our interviewees. According to them, the main reasons to learn more about quantum are:

[plim] to understand science and the world we live in

[plim] because many of today's technologies depend on quantum theory

[plim] so as not to be fooled by quantum pseudosciences.

The latter was the main reason that guided the creation of our podcast. [congas] Whenever possible throughout the episodes, we sought to confront pseudosciences, bringing scientific concepts and quantum theory to the discussion.

[transition]

Lu - We're almost done with this season, [bass] so here's an invitation: now that you understand why it's important to learn about quantum theory, we hope that the podcast has only served as an initial impetus for you to continue searching for knowledge on other reliable sources of information. And, if you want more people to have access to O Q Quântico, how about recommending the podcast to people who want to understand more about the world we live in? This way we also make life difficult for charlatans.

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