

PERCEIVING THE QUANTUM WORLD

Lev Neymotin, PhD

MYSTERY OF QUANTS

When talking about quantum mechanics, there is always a fog of mystery when we start asking questions why this complexity and why no physical tangibility. Physicists always switch to fancy terminology while avoiding explanations that have physical meaning. Physics is tangible. Our weakness of insight leads to all these mysteries of quantum mechanics. We badly need a Richard Feynman to explain all of this, to show that there is no mystery – it's all physical and tangible. Math and equations come later, after we digest the substance and nature of the quantum world. Then go with math...

BICYCLE WHEEL ANALOGY

Elusiveness of quantum world can be compared to us watching a bicycle wheel. When it spins slowly ("slowly" is a relative term determined by our perception capability; slow for humans may be fast for a whale), we can clearly see all spokes as they move from point to point in space. Spin faster, they start to blur into each other. Spin really fast, they disappear. If we were not observing the two situations before with the wheel spinning slowly, there would be no spokes for us – just an empty space.

PERCEPTIONS

Ditto for the quantum world. It is clearly beyond our perception capabilities. And beyond direct perception capabilities of our existing science equipment that was, by and large, with some exceptions in the recent time, of course, designed by following the cues coming from us as we observed and try to investigate the world around us, the cues heavily limited by our perception capabilities, and thus – limited. Most of our discoveries in the quantum world are, in my opinion, by inference, not by direct observation, probing and measuring.

IMAGINATION TO HELP

Having said that, I am trying to create a physical picture of the quantum world. I see the micro-matter as some fuzzy blurbs of energy-matter, always moving, without clear boundaries, almost "mushy", like children's toys. They are always changing in shape and their material substance changes perhaps very slightly while interacting and exchanging energy/mass with other quantum blurbs, perhaps through the unlimited space. They are never constant and so never identifiable, as macro-objects are in our world. And yet, they are not random – they are a result of their constant interaction with the other blobs. As quantum physics tells us, they cannot be tested by our course instruments that would brutally change them on the way of their testing/probing. To really probe them, you would need instruments that are many orders of magnitude smaller than those quantum blurbs – way beyond our imagination...

MYSTERY GONE...

With that physical picture in mind, I feel much less overwhelmed by mystery, and much more comfortable in discussing the quantum world and its phenomena and quantum applications, including quantum computing... With mystery gone, the world may seem even more friendly ☺