Review of: "The Ontic Probability Interpretation of Quantum Theory – Part I"

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I found this to be an interesting paper, although there are a few issues that might help improve its readability. I shall go section by section.

In Section 2, the author writes about 'factual theory'. I am not sure whether this is their own conception or whether it is widely held in the literature, as I have not come across it. The term seems a little odd to me, since facts per se need no theory, but explaining or interpreting them certainly does. In any event, this section reads either as a definition of what a factual theory consists of, or more dogmatically, a statement that this is what a factual theory 'is' as a matter of fact. It would help to know if this concept is taken from the literature or is the author's, in which case it might be better presented in the form of a definition.

In Section 3, the author refers to abstract/real quantons, but it is often unclear at times which they are referring to, or whether their comments refer to both simultaneously, in which case their properties seem to be much the same except for the abstract - real distinction. They do not seem to be the same to me. An abstract entity has a different sort of reality than an entity of physical reality. Abstract entities potentially are eternal and immutable. They write of quantons interacting, but abstract entities do not really interact - they simply are. We formally describe correlations of connections among them, we may use them as tokens to represent other entities, following these constraints. But they themselves do not do anything. Real entities do - they come into being, persist, cease to exist - they act, react, interact. Real entities are restricted; abstract entities are not.

Moreover, in writing about the properties of these quantons, the author describes them in standard quantum mechanical terms - but their earlier description of the concept doesn't require a priori any restriction to a quantum mechanical setting. Quantum mechanics is not the only setting in which there is a concept of measurement, and quantum mechanics does not really have a concept of measurement as an actual interaction between an apparatus and a system, but rather a procedure for calculating the possible values of measurements and their probabilities of being observed from a formal 'wave function'. It is a tool for calculating probabilities, not a description of some underlying reality.

I was unclear on the notion of 'gauge interaction,' whether this had anything to do with gauge symmetry or whether it was just a formal label. I see theories as having, sometimes, gauge symmetries, but measurement per se does not. It is simply expressed by an operator acting on a wave function in a Hilbert space. There is no gauge necessarily there.

In Section 4, the author states that in TOPI, the probability distribution is the physical property of the system. I wonder if they could elaborate because I am not sure in what sense this is the case. There are no units attached to a probability distribution. They are mathematical constructs. They can be approximated by repeated measurements of identical copies of a system - they can't really be determined from a single system. So how are they properties of the system?

While the discussion about probabilities and the accuracy of probabilities is interesting and worth consideration, I was not convinced that Einstein, or EPR together, actually conflated these ideas. Einstein was very good at statistical physics - he had no problem with stochasticity per se - he did have difficulty with many of the wilder speculations arising from various interpretations of quantum mechanics.