

Review of: "Quantum Entities and the Nature of Time"

Vladimir Petrov¹

¹ CERN

Potential competing interests: No potential competing interests to declare.

On L. Chiatti's paper "Quantum entities and the nature of time".

- The author discerns from the very beginning the notions of "quantum entities" and "the elementary particles that constitute them". Without

A special definition such a terminology can lead to confusion as the reader has to himself what is what. If one adheres to the usual use of such terms

then they are conditional and relative.

- For instance, atoms are constituents of large molecules and under certain conditions behave as "elementary units". However, at shorter scales the very atom is rather a "quantum entity" (according to the author's terminology) while electrons and nuclei are its "elementary particles".

Going deeper we see that, in their turn, nuclei cease to be "elementary"

and are rather "quantum entities" consisting of nucleons which are now "elementary". Etc. and so on.

- It is evident now that if to prescribe, at each specific scale, to transitory "entities" some peculiar role of time we come to quite a tangle scheme

difficult both for use and understanding. Thus, terms like "time accessible to elementary particle" look completely ambiguous, if not meaningless.

- Let us now turn to the author's proposal to introduce "complex time" as some novelty. However, complex time occurs routinely, for example, in an axiomatic context. See, for example, the Bargmann-Hall-Wightman theorem.

By complexifying time, the author actually passes from the Minkowski space to the Euclid space. So, he should deal with phenomena like "tunneling" through a potential barrier or, in field-theoretic terms, with instantons. However, these phenomena are ignored by the author.

- It seems to me that what has been said is enough not to waste further efforts on commenting on other subjects of the work.

Unfortunately, I failed to find a rational reason to build such a cumbersome building based on so fuzzy and poorly

motivated concepts, as the author does.

Vladimir Petrov, 04/09/23.