Review of: "The new partitional approach to (literally) interpreting quantum mechanics"

Juan Pablo Jorge[1]

1 University of Buenos Aires

The partitional interpretation analyzed in this article is very interesting and represents an important contribution for all those who are in the fundamentals of quantum physics. Both partitions and associated equivalence relations represent a powerful mathematical method when it comes to representing indistinguishable systems.

However, from an ontological point of view, we must not forget that they are still founded on ZF (or ZFC), therefore, any attempt to fundamental in them a genuine ontological indistinguishability for QM faces the objections raised in [1, 2, 3, 4]. The ZF set theory is a rigid structure, its only automorphism is the identity.

Therefore, any structure that relies on ZF will have entities that can ultimately always be distinguished. Any ZF-based indistinguishability, such as the one presented by Weyl, is a simulated or apparent indistinguishability. In order to support a genuine indistinguishability, authors such as Décio Krause have proposed the theory of quasisets Q. In my opinion, because the concepts of indistinctness/indistinguishability are of vital importance in the article, added to the importance given to the Principle of Leibniz , the alternatives presented through quasisets could be named (for a treatment of genuine insistence on the QM formalism, see for example or example [6], and [5] for an ontology of properties in quasisets that engages with the topic of measurement).

The parallelism with the classical QM formalism is very well presented. It would be a little more detailed and explanatory in section 9 so that the reader does not depend on the recommended bibliography.

[1] Krause, D. (1990). Nao-Reflexividade, Indistinguibilidade e Agregados de Weyl. Tese de Doutoramento,Faculdade de Filosofia, Ciencias e Letras, Universidade de Sao Paulo.

[2] Krause, D. (1992). On a quasi-set theory. Notre Dame Journal of Formal Logic, 33, 402–411.

[3] Arenhart, J. R. B., Bueno, O., & Krause, D. (2019). Making sense of nonindividuals in quantum mechanics.In O. Lombardi, S. Fortin, C. L ópez, & F. Holik (Eds.), Quantum worlds. Perspectives on the ontologyof quantum mechanics (pp. 185–204). Cambridge: Cambridge University Press.

[4] French, S., & Krause, D. (2006). Identity in physics: A historical, philosophical and formal analysis. OxfordUniversity Press.

[5] Holik, Federico ; Jorge, Juan Pablo ; Krause, Décio & Lombardi, Olimpia (2022). Quasi-set theory: a formal approach

to a quantum ontology of properties. Synthese 200 (5):1-26.

[6] Holik, F., Jorge, J. P., & Massri, C.: Indistinguishability right from the start in standard quantum mechanics.arXiv:2011.10903v1