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Problem współmierności wybranych fizykalnych modeli czasu

(Streszczenie rozprawy doktorskiej)

Problem of commensurability of selected physical models of time

(*Summary of the doctoral dissertation*)

In the philosophical literature, the incommensurability of physical models of time has not been deeply analyzed so far. Some nontrivial discrepancies between the features of time in physical theories were noticed by Kurt Gödel (1949), Cornelis Willem Rietdijk (1966) and by Hilary Putnam (1967). Many attempts were made later to find the relativistic equivalents of the classical, Newtonian concepts: „now", „past" and „future". Discussion on time in the contemporary philosophy focuses on problematics generated by disputes between presentism (three-dimensionalism) and eternalism (four-dimensionalism), endurantism (dynamic persisting of beings) and perdurantism (existence by distinct temporal parts), and between A-theories (tensal theories of time) and B-theories (relational theories of time). Problems of time arrow, fatalism, causal structure of spacetime or time travel topological conditions are disputed as well. There has been no specific attempt, however, to analyze the discrepancies mentioned above within the framework of Thomas Kuhn (1922-1996) and Paul Feyerabend (1924-1994).

The aim of this dissertation is to present arguments for incommensurability among three models of time: in the Newtonian physics, in the Special Relativity and the General Relativity, especially in the standard cosmological model as the paradigmatic application of GR. The distinctive aspects of discrepancy of time models are concerned: taxonomic, methodological, and ontological, as well as different interpretations of emipirical data and different empirical predictions, due to Kazimierz Jodkowski's analysis of the notion of imcommensurability in the works of Kuhn and Feyerabend. Specifically, an attempt to formulate a synthetic notion of incommensurability is made, concerning the philosophy of Kuhn, Feyerabend and the precursor of their ideas: a Polish microbiologist Ludwik Fleck (1896-1961) who was the first who used this term in the philosophy of science. An analysis of temporal concepts in the mentioned physical theories is presented, with a distinctive status of "now" and "simultaneity". Some examples of noninferential reductions of relativistic theories to the Newtonian formulas are also shown. A few different interpretations of empirical data and predictions within all the three mentioned theories are

presented, including phenomena that refer to time dilation, redshift, and gravity. The ontological implications of the three ideas of time are discussed, especially the relationship between “being real” and “being now” and the very concept of being in the traditional metaphysics, as well as some notes on the unity of a piece of art. Concernig this, some reflections on the meaning of scientific and human notion of time are presented.

To present the selected models of time, the historical context of formulating physical theories is taken into account. The analysis invokes the fundamental philosophical definitions of time: Aristotelian and Newtonian. It also refers to the mathematical formulas of Newtonian and relativistic physics, including relativistic cosmology. An original construction of a relativistic counterpart of “now” is presented by the author of this dissertation: ALEX* – an Alexandroff set (ALEX, specious present) generalized for all moving observers in the spacetime of SR. For the analysis of cosmic time, the author uses diagrams generated on the base of his own numerical calculations and the Planck cosmological data (2018). The shape of the chorodesic hypersurface of Einstein synchronization in the spacetime of the standard cosmological model (first proposed and approximated by Marc Lachièze-Rey) is also calculated and presented by the author.

Key words: incommensurability, time, philosophy of time, philosophy of science, theory of relativity