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Subject
Report on Dissertation Manuscript by P. Švarny

Supervisor's report on the doctoral dissertation
"Observing time: Inferences in static universes" by Petr Švarny

The manuscript of this dissertation is the result of an extended period of work and study, starting in 2011, after the completion of the author's master's thesis *Application of temporal logics in physics* (Charles University 2011). In the early years of this research project clear progress was made: after having contacted the Utrecht HPS Institute for possible supervision, Petr Švarny made a personal visit to Utrecht and took an exam there, on space and time. He also participated in a workshop for young researchers (partly organized by the Utrecht Institute) and gave a talk (Bertinoro 2012), published in a Proceedings volume (*New directions in the philosophy of science*, Springer, 2014). This material did not yet go far beyond the master's thesis, but it did hold promise. Unfortunately, soon thereafter Petr was compelled to split his focus and to devote considerable attention to other duties; this hampered the pace of further development. The last paper that I heard him give (Varna, 2016 Minkowski meeting, published in the *Proceedings*, Minkowski Institute Press, 2017) accordingly showed only limited progress.

The dissertation as presented now consists of an introduction, five chapters and two appendices. In the nicely written and promising Introduction Švarny explains his two main research questions: 1. How can a Block universe be consistent with our perception of change; 2. How can the structure of time, especially in the Block universe, be captured in logical terms so that a maximum of clarity and accuracy is achieved.

Chapter 1 aims at providing the general philosophical and historical background needed to place the two questions in context. The chapter goes some way towards its stated aim, by mentioning several questions, dilemmas, and research directions in the philosophy of time, but these various themes as here presented lack interconnection. I think that the chapter therefore does not fully succeed in presenting a coherent background for the other chapters.

Chapters 2 and 3 contain the essence of the dissertation: the logical analysis of time and, especially, the formal treatment of branching time in the sense of Belnap, Placek and Müller. Chap. 2 is mainly a summary of work that is well known, although it is not presented in the clearest way and contains mistakes. For example, the contrast between Ockhamism and Peirceanism is not correctly described, the crucial idea of the captain's choice being earlier than the sea battle is not mentioned, the formula for B on p. 34 makes no real sense, and there are several other deficiencies.

Chapter 3 should contain the novel material of the thesis, but the formal machinery that is put to work here is questionable in several places. For example, Theorem 7 is wrong in the generality in which it is stated, Lemma 10 has the subset inclusion wrong, and a very unclear proof, Definition 13 is faulty, and there is a mistake in Theorem 45 and its proof. Generally speaking, proofs of theorems are sometimes absent, and if present often contain problematic elements.

Chapters 4 and 5 are very short. The conclusion of chapter 4 that an observer cannot tell whether she is living in a block universe or in some dynamic universe seems correct to me. It is not a surprising or novel conclusion, though. Even so, I find the argument given for this conclusion here (last sentence of 4.2) lacking in clarity.

The summary in Chapter 5 is not very informative, due to its brevity.

Judging by the standards I am familiar with, I find that the manuscript is "too light" to serve as the basis for awarding the PhD degree. There is much material in it that is available in better form in other places, and the part that is meant to be novel (formal analysis of branching space-times) is inaccurate in places and moreover it is not clear what exactly it proves with respect to the main research question of the dissertation.

Yours sincerely,

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