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Indeterminism is a modal notion: branching spacetimes and Earman’s pruning. (English)

Summary: The paper defends an Aristotelian notion of indeterminism, as rigorously formulated in the framework of branching space-times (BST) of N. Belnap [Synthese 92, No. 3, 385–434 (1992; Zbl 0776.03001)], against criticism by J. Earman’s “Pruning some branches for branching spacetimes”, in: D. Dieks (ed.), The ontology of spacetime. II. Amsterdam: Elsevier. 187–206 (2008), Chapter 10] based on a model-theoretic characterization of indeterminism. It delineates BST branching against the background provided by Earman’s distinction between individual versus ensemble branching. Partly in order to motivate our responses to Earman, it describes a construction of physically motivated BST models, in which histories are isomorphic to Minkowski spacetime. Finally it responds to Earman’s criticisms leveled against BST by addressing a topological issue, the question of an actual future, the past/future asymmetry, and some semantical questions.

MSC:
03A05 Philosophical and critical aspects of logic and foundations
03A10 Logic in the philosophy of science
83A05 Special relativity
83F05 Relativistic cosmology

Keywords:
indeterminism/determinism; spacetimes; branching space-times; tenses

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References:


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