

The Many-Worlds Interpretation of Quantum Mechanics: Psychological versus Physical Bases for the Multiplicity of "Worlds"

Barnum, Howard (1990) The Many-Worlds Interpretation of Quantum Mechanics: Psychological versus Physical Bases for the Multiplicity of "Worlds".

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Abstract

This unpublished 1990 preprint argues that a crucial distinction in discussions of the many-worlds interpretation of quantum mechanics (MWI) is that between versions of the interpretation positing a physical multiplicity of worlds, and those in which the multiplicity is merely psychological, and due to the splitting of consciousness upon interaction with amplified quantum superpositions. It is argued that Everett's original version of the MWI belongs to the latter class, and that most of the criticisms leveled against the MWI, in particular that it is illogical or incoherent, are not valid against such "psychological-multiplicity" versions. Attempts to derive the quantum-mechanical probabilities from the many-worlds interpretation are reviewed, and Everett's initial derivation is extended in an attempt to show that these are the unique possible probabilities. But there remains a challenge for proponents of the MWI: to show that their interpretation requires probabilities, rather than merely nonprobabilistic indeterminacy. A 2002 preface, revised in 2004, briefly discusses the extent to which I still agree with the claims in the paper. While its derivation of probabilities used, and failed to justify, noncontextuality, I still agree with the paper's general interpretation of the MWI, though not with the MWI itself.

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