

Algebraic Approach to Quantum Gravity: relative realism

Majid, Shahn (2007) Algebraic Approach to Quantum Gravity: relative realism.

Full text available as:

[PDF](#) - Requires a viewer, such as [Adobe Acrobat Reader](#) or other PDF viewer.

Abstract

In the first of three articles, we review the philosophical foundations of an approach to quantum gravity based on a principle of representation-theoretic duality and a vaguely Kantian-Buddist perspective on the nature of physical reality which I have called 'relative realism'. Central to this is a novel answer to the Plato's cave problem in which both the world outside the cave and the 'set of possible shadow patterns' in the cave have equal status. We explain the notion of constructions and 'co'constructions in this context and how quantum groups arise naturally as a microcosm for the unification of quantum theory and gravity. More generally, reality is 'created' by choices made and forgotten that constrain our thinking much as mathematical structures have a reality created by a choice of axioms, but the possible choices are not arbitrary and are themselves elements of a higher-level of reality. In this way the factual 'hardness' of science is not lost while at the same time the observer is an equal partner in the process. We argue that the 'ultimate laws' of physics are then no more than the rules of looking at the world in a certain self-dual way, or conversely that going to deeper theories of physics is a matter of letting go of more and more assumptions. We show how this new philosophical foundation for quantum gravity leads to a self-dual and fractal like structure that informs and motivates the concrete research reviewed in parts II,III. Our position also provides a kind of explanation of why things are quantized and why there is gravity in the first place, and possibly why there is a cosmological constant.

Keywords: quantum gravity, Plato's cave, Kant, Buddhism, physical reality, quantum logic, quantum group, monoidal category, T-duality, Fourier transform, child development

Subjects: [General Issues: Laws of Nature](#)
[Specific Sciences: Physics: Cosmology](#)
[General Issues: Realism/Anti-realism](#)

ID Code: 3345

Deposited By: [Majid, Shahn](#)

Deposited On: 15 May 2007