Early Greek Thought and Perspectives for the Interpretation of Quantum Mechanics: Preliminaries to an Ontological Approach.

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Abstract

It will be shown in this article that an ontological approach for some problems related to the interpretation of Quantum Mechanics could emerge from a re-evaluation of the main paradox of early Greek thought: the paradox of Being and non-Being, and the solutions presented to it by Plato and Aristotle. More well known are the derivative paradoxes of Zeno: the paradox of motion and the paradox of the One and the Many. They stem from what was perceived by classical philosophy to be the fundamental enigma for thinking about the world: the seemingly contradictory results that followed from the co-incidence of being and non-being in the world of change and motion as we experience it, and the experience of absolute existence here and now. The most clear expression of both stances can be found, again following classical thought, in the thinking of Heraclitus of Ephesus and Parmenides of Elea. The problem put forward by these paradoxes reduces for both Plato and Aristotle to the possibility of the existence of stable objects as a necessary condition for knowledge. Hence the primarily ontological nature of the solutions they proposed: Plato's Theory of Forms and Aristotle's metaphysics and logic. Plato's and Aristotle's systems are argued here to do on the ontological level essentially the same: to introduce stability in the world by introducing the notion of a separable, stable object, for which a principle of contradiction is valid: an object cannot be and not-be at the same place at the same time. So it becomes possible to forbid contradiction on an epistemological level, and thus to guarantee the certainty of knowledge that seemed to be threatened before. After leaving Aristotelian metaphysics, early modern science had to cope with these problems: it did so by introducing "space" as the seat of stability, and "time" as the theater of motion. But the ontological structure present in this solution remained the same. Therefore the fundamental notion `separable system', related to the notions observation and measurement, themselves related to the modern concepts of space and time, appears to be intrinsically problematic, because it is inextricably connected to classical logic on the ontological level. We see therefore the problems dealt with by quantum logic not as merely formal, and the problem of `non-locality' as related to it, indicating the need to re-think the notions `system', `entity', as well as the implications of the operation `measurement', which is seen here as an application of classical logic (including its ontological consequences) on the material world.

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